201 * Wednesday, August 28th, 2019 * 8:30:00 AM
Jim Somerville, KCI Technologies
BIMs for Asset Management

Speaker Bio: Mr. Somerville is an enterprise systems architect with 15 years experience helping local and state organizations adopt technology and optimize processes to achieve business requirements and objectives. Mr. Somerville focuses on the infrastructure asset management and emergency management sectors in the mid-Atlantic region.

Abstract: Planning and engineering design is increasingly being conducted in 3D. New surveying methods such as Lidar scanning, unmanned aerial systems, and gradiometers are capable of providing previously unheard of capabilities to capture below-ground, indoor, and above ground assets in three dimensions. This presentation will demonstrate how resulting building information models (BIM), from both planned and built sites, can serve as foundational datasets supporting multiple objectives within an agency's asset management program. This includes integrating a design BIM during asset handover, or obtaining a true and current as-built (including abandoned assets) of an existing site through site surveys. The ability of 3D models to provide location and spatial context to enhance operations and maintenance, particularly coupled with maintenance management systems, will also be demonstrated and discussed. Principles and strategies will be backed by case studies and lessons learned through recent pilot projects.

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Christopher Overcash, EA Engineering, Science, and Technology, Inc., PBC

Climate Change Resiliency Planning for Water and Wastewater Systems: Northern Chesapeake Bay

Speaker Bio: Mr. Overcash is a Senior Engineer with EA Engineering, Science and Technology, Inc. PBC in Hunt Valley Maryland. He is a licensed professional engineer in 7 states, a Board Certified Environmental Engineer, and is also credentialed by the Institute for Sustainable Infrastructure and the U.S. Green Building Council. He holds a Masters of Environmental Engineering from John Hopkins University where he is also an adjunct professor and an Associate of the Environment, Energy, Sustainability and Health Institute.

Abstract: Planning for the resiliency of water and wastewater systems located in low lying areas is becoming or will become one of the paramount challenges of system owners as the effects of climate change including sea level rise are becoming more defined by events around the globe and in the local area. In the upper Chesapeake Bay region sea level rise from climate change and other factors in this area, including land subsidence, is predicted to increase water levels up to 2.3 ft by 2050 and 6.9 ft by 2100. Additional impacts from storm events including storm surge and wave action will increase water levels further resulting in both periodic and prolonged flooding of areas within Harford, Cecil and Kent Counties which encompass the upper Chesapeake Bay region. Each area has critical water and wastewater infrastructure within the possible highwater areas which will need to be carefully managed over time to provide the necessary resiliency of these critical systems. A planning document recently completed by EA Engineering, Science, and Technology, Inc., PBC for these counties is helping define the needs for these systems. Coastal resiliency and adaptation plans for the water and wastewater systems for each of these counties will need to be robust to be adapted to changing conditions in the future. The extent of sea level rise expected from climate change is variable based upon a wide variety of scenarios and conditions that may change from the present to 2100 in terms of societal interests, goals and objectives. To effectively plan it is necessary to develop management procedures to decrease the risks associated with sea level rise that are based on the best science available and are appropriate in terms of both scale and timing. Development of an adaptation plan including long term monitoring will be a crucial part of maintaining water and wastewater systems in the future. In addition to outlining a general adaptation plan for water and wastewater systems, it is important to provide a listing of infrastructure resiliency strategies and associated measures that can be used to reduce risks from flooding, storm surge and wave action. These resiliency measures can include nature-based (e.g., wetlands) and structural (e.g., seawalls, groins) as well as non-structural measures.

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Matthew Van Horne, Hazen and Sawyer

How Much Digestion Volume Do You Really Need for a THP Facility?

Speaker Bio: Matt Van Horne is an Associate Vice President with Hazen and Sawyer in their Fairfax, VA office where he has been for 10 years following over 5 years of experience in California. He is a registered professional engineer in seven states including Virginia, Maryland and New York and earned Bachelors and Masters degrees in Civil and Environmental Engineering from Massachusetts Institute of Technology. His areas of focus are biosolids management, energy optimization and wastewater treatment.

Abstract: The Washington Suburban Sanitary Commission (WSSC) is in the process of implementing a Bio-Energy project to thermally hydrolyze and anaerobically digest all of their biosolids from their 5 Water Resource Recovery Facilities (WRRFs) to produce a Class A biosolids product. As part of this project mesophilic anaerobic digesters will be constructed at the Piscataway WRRF to provide the necessary stabilization and digester gas production to meet regulatory requirements as well as produce valuable digester gas, which will ultimately be converted to renewable natural gas. As part of the early development in the Progressive Design Build (PDB) process, the project team considered how to best approach a series of critical decisions related to the digestion process to provide the best long term process performance, energy efficiency and potential future expandability. The critical decision areas that needed review and discussion included: Mixing approach, Digester sizing, Rapid volume expansion containment approach, Digested sludge storage approach and Digester construction method These five decision areas were considered individually and together to understand the range of advantages and disadvantages that each would have on the overall project. The presentation will review all five of these areas in relation to their impact on a thermal hydrolysis facility. One of the key discussion points across the Project Team was how to best implement digested sludge storage to accommodate intermittent post-dewatering possibly combined with rapid volume expansion containment. The presentation will present the selected approach, its advantages and disadvantages, and how the overall approach on the project site through the use of 3D modelling of the individual facilities and the overall site.

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Thomas Spokas, Philadelphia Water Department
Philadelphia's Risk Reduction Approach to Master Planning

Speaker Bio: Thomas Spokas is the Program Manager of the Philadelphia Water Department's Facilities Planning Program. He has a BS in Civil Engineering from Drexel University and MS in Community and Regional Planning from Temple University. He is Professional Engineer in the State of Pennsylvania.

Abstract: In 2016, Philadelphia Water Department (PWD) embarked upon development of a comprehensive master plan for the water system. A risk-based approach was used to identify the most cost-effective projects to meet the level of service (LOS) goals while reducing the identified risks to meeting the goals. The LOS goals covered areas such as water quality, water quantity, service pressure, operability, affordability and public perception. The risk-based approach was structured to align with PWD's organization-wide approach to risk management and reduction. A comprehensive asset registry for all water facilities was developed to support the master planning requirements. This registry was used to document asset condition during field inspection activities. The field inspection results were used to determine remaining useful life of each asset and the corresponding likelihood of asset failure. Similarly, the asset registries were used to evaluate the consequence to water supply of individual asset failure, with single-points of failure receiving the highest score. In addition to consideration of the risk of asset failure, a thorough risk register was developed to identify possible environmental or regulatory related events that pose risks to meeting the LOS goals. Environmental risks identified included loss of power and severe weather events such as flooding of facilities and icing at intakes. Regulatory risks identified included changes in source water quality affecting compliance with current regulations and changes to existing regulations or addition of new regulations Based on this risk register, these risks were scored based on their likelihood of occurring and consequence to city-wide water supply. This risk approach enabled prioritization of master plan improvements based on their ability to mitigate or remove risks from the system. This approach in the context of a comprehensive master plan led to overall reduction of system risk. Additionally, by using a system-wide approach, mitigation of multiple types of risks, such as environmental and asset failure risks, could be accomplished through single improvements. This paper will review the risk-based approach used by PWD in water system master planning and demonstrate the benefits available to other utilities that use this approach.

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Paul Deardorff, JMT

Improvements at the Eastern Avenue Pumping Station to Improve Collection System Performance

Speaker Bio: Paul Deardorff is a project engineer with JMT. Mr. Deardorff has 14 years of experience in consulting engineering. His experience includes evaluation, design and construction of water and wastewater conveyance, pumping and treatment systems.

Abstract: The Eastern Avenue Pumping Station is owned and operated by the City of Baltimore. The Eastern Avenue Pumping Station receives flow from 84" and 60" influent conduits. The 84" conduit runs through the Inner Harbor area of Baltimore collecting flow from the highly commercial western and central portions of the Low Level Sewershed. The 60" influent conduit conveys flow from the eastern Low Level Sewershed including the Harbor East, Fells Point and Canton Neighborhoods. The Eastern Avenue Pumping Station has a firm capacity of 131 million gallons per day (MGD) with the largest pump out of service. With all five pumps in service, the station has a total capacity of 171 MGD. The pumps discharge into three force mains, which deliver flow to a discharge structure at the head of the 99-inch Outfall Sewer. The wet well operating level at the Eastern Avenue Pumping Station has a direct impact on the water surface elevation in the upstream collection system and the current operating level results in a multi-foot high backwater condition in the Low Level Interceptors. This backwater condition reduces flow velocity, increases solids deposition, and limits available interceptor capacity for wet weather events which increases the likelihood of SSO events. As part of the City of Baltimore's continuing efforts to meet its commitment to eliminate Sanitary Sewer Overflow (SSO) events, the City is evaluating improvements to the pumping systems at Eastern Avenue Pumping Station. The City's wet weather program modeling efforts have indicated that the Eastern Avenue Pumping Station wet well operating level has a significant impact on collection system performance and SSO reduction. The improvements at the pump station will focus on alternatives to lower the wet well operating level while maintaining efficient pumping operations. This presentation will discuss pump sizing alternatives and the selection of pumps to meet influent flow conditions ranging from 5 to 130 MGD. Additionally, pump power supply and controls alternatives to meet the wide range of influent flows will be discussed. The presentation will discuss the constraints associated with lowering the wet well operating level. Constraints include the existing wet well, which was constructed in 1912 with dedicated sumps for each pump suction and no means of isolation. The presentation will discuss minimum submergence requirements for the pumps, as recommended by Hydraulic Institute standards for suction bells and formed suction inlets. A discussion of Net Positive Suction Head Required (NPSHR) and the impact on wet well operating level will be provided, as well. A summary of recommended modifications and improvements to the pumping system to meet the City's goals for collection system performance will be provided. This presentation will be useful to industry professionals who are evaluating improvements to pumping systems to meet wet weather capacity, maximize collection system performance and optimize pump performance.

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Chanda Albrittain, DC WATER - Blue Plains Advanced WWTP

True Grit: Retribution in the Wild West Grit Chamber at DC Water's Blue Plains Advanced Wastewater Treatment Plant

Speaker Bio: Chanda Albrittain has been in the Wastewater industry for 15 years. Chanda works at the DCWATER Blue Plains Advanced WWTP as an Operations Support Specialist. She is passionate about developing engineering controls to improve housekeeping and the efficiency of operations.

Abstract: This isn't the story of an Academy Award winning film but rather a low budget approach to a problemthat just might save DC Water an opening weekend's revenue.The grit conveyor's in DC Water's Headworks at the 380MGD Blue Plains Advanced WastewaterTreatment Plant move approximately 4,000 tons of grit per year. With aging equipment and wearingparts, a significant portion of that grit was ending up on the floor and providing an ideal food source andhabitat for some of the District's most unwanted residents – no, not politicians – but rats.The resulting mess required full time attention in the form of an industrial cleaning contract to removegrit piles around the conveyors daily. A root cause analysis investigation in to why so much grit wasfalling on the floor revealed a belt cleaning system that was not performing to expectation, and couldnot be well maintained by the Authority's staff. Further, with the belts not being scraped of grit, it wouldcause additional wear to other components on the equipment, including the rollers. After discoveringthat the original parts were unavailable and in house modifications were not successful in solving theissue, a minor redesign was proposed and a contractor was engaged.This presentation will give an overview of how a simple fix expects to save DC Water at least $60,000annually, as well as create a cleaner and safer environment for staff by an 80% or greater reduction inthe amount of grit falling on the floor. This goes along with the update of a system that is easier tomaintain for a true win-win-win.

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Gregory Stephens, DC Water
The RCM Road to Salvation

Speaker Bio: Gregory is one of three Operator Foreman at the pumping stations at DC Water. He is responsible for day to day operations at 29 pump stations for water, sewer, and wastewater. He serves as Vice-Chair of the Plant Operations & Maintenance/Safety Committee for CWEA, and has been one of the key leaders of the Reliability Centered Maintenance effort underway at DC Water.

Abstract: Last year at TriCon, DC Water gave a presentation that focused on Reliability Centered Maintenance (RCM) and how they have adopted the methodology to overhaul their approach to Operations and Maintenance at Water, Sewer, and Stormwater Pumping Stations. The fundamentals of RCM were developed in the 1970s by revolutionary thinkers at United Airlines, and some of the early adopters included the U.S. Navy for its nuclear-powered attack submarines, and the Nuclear Regulatory Commission (NRC) in the wake of the Three Mile Island (TMI-II) meltdown. RCM has a simple concept – reduce the life cycle cost of an asset and improve its reliability – and this is done by a detailed look at functions, functional failures, failure modes, and consequences, and then designing the most effective maintenance tasks to prevent, mitigate, and/or find the proposed failures. DC Water began its RCM journey in the summer of 2017, and last year's Tricon presentation was a review of the process that was developed and implemented - from system selection to implementation and beyond. We examined some of the results, and discussed in detail the success stories, the challenges, and some of the out of the box thinking that occurred. The early indications were nothing short of eye-opening as during the pilot study, the results led DC Water to modify over 90% of the preventive maintenance program for the target assets. Since early 2018 and continuing over the next several years, DC Water will complete RCM analyses and implementation at all 29 pumping stations within its system. As of January 2019, DC Water completed the analyses and implementation of RCM recommendations at an additional 4 stations and it is expected to complete 3 more stations by Tricon 2019. Results from these efforts will be shared along with lessons learned and helpful hints for those attendees interested in pursuing RCM as a highly-effective Operations and Maintenance strategy. Finally, the presentation will touch on the next steps for the program which will include starting to integrate Reliability Centered Design into RCM so as to optimize the asset's ability for maintainability.

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Mike McGill, WaterPIO

Communicating Emerging Contaminants to Your Customers and Key Stakeholders

Speaker Bio: Before founding WaterPIO, a PR firm focused on helping water utilities, Mike McGill directed communication and customer service operations for water utilities for a dozen years. His positions included: Chief Communications Officer for Cape Fear Public Utility Authority in Wilmington, North Carolina; Director of Customer Relations and Communications for Loudoun Water; and Public Affairs Unit Coordinator for the Washington Suburban Sanitary Commission. Mike is a graduate of Syracuse University and began his career as a news producer with CNN and WUSA-TV in Washington, DC.

Abstract: Water utilities have long relied on regulatory guidance to help them handle contaminants of emerging concern. Unfortunately, advances in water testing are vastly outpacing the regulatory process. As a result, several "new" emerging contaminants (ECs) are being found in parts-per-trillion (ppt) amounts. When discovered and revealed to the press, the negative attention they gain from the public can catch utilities off-guard, harming their credibility on safety. We believe ECs represent the greatest threat to public confidence in their drinking water for the foreseeable future. In 2016, a study conducted by an NC State team of researchers found multiple PFASs in significant ppt levels in the raw and finished water of the Cape Fear Region's largest utility. When the study was released, it didn't garner much notice, even from environmental activists. Six months later, however, the study was sent to the region's leading newspaper and everything changed. The findings grabbed their attention. The newspaper contacted the utility more than three weeks before publication. Despite the contact, the utility did not reverse its initial decision to stay completely silent about the study's results, even internally. Top management decided not to tell its board, local elected officials, other affected utilities in the area, or its customer service staff. When the story hit, it shocked the public. The 90-point headline? "Toxin Taints Drinking Water." Because the utility did not inform the public first, it was immediately viewed as taking part in a cover-up. The lack of in-house preparation also left customers unable to get answers to basic safety questions from call agents or the utility's website. Frustration was aired by blindsided elected officials and by the media, whose calls went unreturned. Online anger was extreme and public confidence in the utility fell fast. The leading media outlet in the area stated trust in the water utility was permanently shaken. WaterPIO began our work with emerging contaminant communications in 2008, working with the Associated Press after they discovered trace amounts of several pharmaceutical drugs in DC-area drinking water. We've been in the middle of the NC news since before it hit the public space in 2017. Since that time, we have served as an independent source of information, helping multiple utilities, elected officials, activists, reporters, editors, and customers. We have helped several utilities manage the impacts of the EPA's 2018 National PFAS Summit and Community Meetings and the utility involved in the discovery was hired us to provide communications assistance into 2019. The presentation will briefly walk attendees through the GenX/other EC discoveries and focus on the communications process throughout the situation. It will detail why the time to communicate about ECs is now, before the issue become a known-unknown in your area. Attendees will also walk away with an understanding of how news of a discovery is handled by the press and how they can prevent being caught off-guard when the media comes calling. It will close with the lessons learned, focusing on the strategies that have worked with customers and key stakeholders.

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Anjana Kadava, Black & Veatch

Improved Design of Secondary Clarifiers for More Efficient Solids Removal

Speaker Bio: Anjana is a Process Engineer with Black & Veatch and has 13 years of experience on projects for upgrades and expansions of both liquid and biosolids treatment processes. She is a registered Professional Engineer with a Master's degree in civil & environmental engineering from the Missouri University of Science & Technology. Anjana is a member of WEF Task Force on Envision Sustainability System. Her recent projects include BNR retrofits, wet weather treatment, and carbon footprint evaluations----------.

Abstract: PROBLEM STATEMENT AND DESIGN APPROACH- As nutrient removal from the water resource recovery facilities (WRRFs) is gaining traction, activated sludge technologies continue to become more sophisticated to keep up with the challenge. The activated sludge process is a "paired system" consisting of the biological tanks removing the organic load and the secondary clarifiers removing particulate matter. The operating MLSS concentration in the activated sludge basin coupled with plant flow sets the solids loading rate on the clarifier. It has always been the designer's choice to either increase clarifier diameter to reduce the solids loading rate or increase the basin volume and lower the operating MLSS concentration at a given SRT. In addition to refining the biological process, improving secondary clarifier design is critical as the facility effluent limits are made more stringent. Furthermore, as the wet weather flows become a significant portion of the influent to these WRRFs, improved design of the secondary clarifier internals can reduce the occurrences of solids carryover into the plant effluent. Secondary clarifiers are often regarded as simple settling tanks like primary clarifiers. After all, they look very similar in most cases. However, the two applications have subtle but significant differences. Primary settling involves a low concentration of discrete particles (discrete settling), while secondary clarification involves a high concentration of lower density flocculated particles (hindered settling). The mixed liquor floc particles are only slightly denser than the surrounding water. Furthermore, the continuous underflow of high-solids return activated sludge (RAS) make secondary clarifiers more like continuous liquid/liquid separators than relatively static solids settling processes. This dynamic separation can create unwanted density currents, and features that control density currents are the "secret" to optimizing clarifier performance, particularly when pushed by peak flows. DESIGN FEATURES- Key design features for the treatment facilities in Johnson County, Kansas and Little Rock, AR will be discussed along with lessons learned from their development, including: (A) Inlet Energy Dissipation - A variety of energy dissipating inlets (EDIs) have widespread use in the US. However, not all EDIs will eliminate the "waterfall effect" or density current formation. (B) Feedwell Floor Baffle - Originally proposed in the 1970's by KU's Dr. Ross McKinney, this is standard practice in the UK and Germany and is emerging in the US. This simple baffle practically eliminates density current formation and is particularly helpful for scraping sludge collectors. (C) Effluent Launders and Peripheral Baffles - Interior launders and inward projecting peripheral baffles have become standard practice to minimize solids carryover from "wall creep" and related hydrodynamics near basin sidewalls. (D) Managing activated sludge SVI – BNR systems have anaerobic and anoxic zones that condition MLSS to improve the SVI. Surface wasting is gaining acceptance as a method to also control SVI without chemical addition.

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Russell Deason, Mott MacDonald
Real Time Hydraulic Modeling at DC Water

Speaker Bio: Russell Deason is a Senior Project Engineer with Mott MacDonald in Arlington, Virginia, and a licensed engineer in DC, Virginia, and California. He has 9 years' experience working in the water and wastewater industry on design, modeling, condition assessment, operation support, and smart infrastructure projects.

Abstract: DC Water is developing a tool that runs a hydraulic model of the water distribution system in near real-time and provides a representation of actual system conditions based on boundary conditions provided by SCADA and other real-time data sources. The purpose of this presentation is to discuss why DC Water is developing this tool, the hurdles and challenges in developing it, and to show how a real-time hydraulic model can be used to provide insights, solve problems, and bring value to the organization and ultimately to its customers. DC Water has developed a state-of-the-art hydraulic model for its water distribution system. The model supports a variety of decisions for capital planning, watermain replacement, developer requests, shutdown planning, and water quality support. For these kind of analysis, the inputs needed include pump status, tank levels, demands, and valve positions. Typically, this is done using some assumptions for future conditions or using historical data to replicate some past condition. Where available, near real-time data can be used to run a model that reflects actual hydraulic conditions in the water distribution system. This "operationalized" hydraulic model can be used to tell what the theoretical pressure should be anywhere in the distribution system, which provides operators with additional situational awareness to help them do their jobs more effectively. Theoretical pressures can be compared with actual pressure measurements to identify anomalies and troubleshoot issues. Pumping operators can quickly see how their operations affect pressures in the system where there may not be pressure monitoring. "What if" scenarios can be run to quickly see how an activity may affect the system. Most of the data needed to run the model in real-time is in SCADA system, but other data sources can also be used including AMI and work order databases. Security is a significant concern when integrating with these systems. Data from third party systems like remote pressure sensors can also be integrated and compared with model results and identify issues. Also, for the tool to be useful, it must be accessible to operators. This requires development of a front-end user interface to serve up all this information in a way that is usable and insightful. This presentation will include a preview of the user interface that DC Water is testing.

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Tonya Chandler, Anue Water Technologies
A FOG Farewell: Automated FOG Prevention Saves Time, $$$, and Prevents Odor

Speaker Bio: Tonya Chandler is the Vice President of Sales and Marketing for Anue Water Technologies. She has worked in the wastewater industry for over 20 years, with a focus on biological wastewater treatment, disinfection, process separation, membrane filtration and odor/corrosion prevention. She has worked with Veolia Water and Shaw Environmental/Envirogen to establish innovative projects in both municipal and industrial applications. Tonya lives with her husband and children in northern Wisconsin near the Mississippi, where they have a front-row seat for surface water challenges.

Abstract: Fats, oils and grease (FOG) accumulation is a universal problem in lift stations. When buildup occurs, the thick, solid mats can disrupt service, damage equipment, cause odors and overflows, and are a costly maintenance item. Wet well clean-outs require confined-space expertise and pose risks to the safety of the staff. By preventing build-up of FOG, collection network teams can work on other priorities, and receive fewer emergency calls for spills or overflows. And less FOG = less odor. One municipality was spending 18 man-hours every two weeks doing confined-space entry to clean out one lift station. Multiplied across all the lift stations in the city and you can see how expensive it is to stay on top of FOG build-up. After implementing the Enviroprep well washer, they have reduced clean-outs to once every six months. This presentation will focus on the case studies of several municipalities that had serious FOG issues and chose to implement the EnviroPrep to solve the problems. It will go over the process of how one city evaluated it - by testing it on a 5-gallon bucket full of grease - to the hour-by-hour evaluation of the system in progress, where one lift station had a 4 foot blanket of FOG cleared in just two hours. A municipality in Michigan has been using the Enviroprep in several lift stations where the technology has solved problems with mats caused by grease and other particles adhering to paper in the network. Photos and videos will be included in the presentation. The Enviroprep system that has been used to address the problems faced by these cities' sewer authorities is chemical-free and uses discharged wastewater to do the work. The well washer uses a grinder pump to break up wipes, rags and large pieces in the pipe. It provides surface agitation necessary to homogenize solids and break the buildup, which eliminates FOG and biofilm in the process. We know that the main cause of odor in sewer networks is the development of hydrogen sulfide, or H2S. Hydrogen sulfide develops in the absence of oxygen. With the agitation of the wet well by the Enviroprep, oxygen is added to the water, which reduces odor. The prevention of mats doesn't give the bacteria a chance to become septic. The Enviroprep normally runs a few times per hour, or on a schedule determined by the operator, based on the requirements of the lift station. There are over sixty lift stations around the country that are kept FOG-free with the Enviroprep solution, including several in the Washington, D.C. area.

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Patti-Kay Wisniewski, EPA Region III
America's Water Infrastructure Act of 2018 Requirements Now and into the Future

Speaker Bio: Patti Kay has been with EPA Region III for over 33 years performing a wide range of duties including: state grants and contracts management; Consumer Confidence Report Rule, Public Notification Rule and the Revised Total Coliform Rule workgroup participation; and implementing climate change initiatives within the drinking water program. Patti Kay has a Bachelor of Science degree in environmental science from Cook College, Rutgers University.
Since 2002, she has been the Drinking Water Security Coordinator in the Drinking Water program, working on security and emergency preparedness related matters; leading efforts to staff a regional Water Support Team to provide support to the states and utilities in the event of an emergency.
During 2015, she had the opportunity to serve as the Drinking Water Branch Chief.
She is a lifetime member of Water Works Operators Association of Pennsylvania and a Silver Drop member of PA section AWWA.

Abstract: This new Act places requirements on water suppliers that are fast approaching. This presentation will cover the details of the requirements, deadlines, how to submit certifications and tools and guidance EPA has developed to assist with compliance. Unlike past requirements, these are on-going, not once and done assessments.

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Russell Titus, New Jersey American Water
Business Case Considerations for Leakage Control

Speaker Bio: Russell Titus is a Senior Superintendent at New Jersey American Water where he is responsible for the state's water loss management strategy including preparing water audits, supervising proactive leak detection operations, and piloting new leakage and condition assessment technologies. He enjoys meterology and will give you the "real" weather forecast if you request it! Russ graduated with Bachelor and Master's Degrees in Geophysical Science from Montclair State University, and holds additional certifications from Rutgers University.

Abstract: AWWA Manual 36, Water Audits and Loss Control Programs, provides the essential methodologies for identifying and preparing sustainable leakage management programs. After controlling apparent losses, system owners and operators are faced with the daunting task of identifying which programs to institute or accelerate to better control real losses. Examining and understanding a system's buried linear assets is essential for the success of any real loss control program. Buried water distribution pipes are often a water utilities most valuable asset and the expectations of these asset owners must be incorporated into such plans. These assets and their value, whether public or investor-owned, are viewed by ratepayers and regulators monolithically. The networks need intrinsic evaluation so evidence-based maintenance and capital asset purchases may be properly applied. New leak monitoring systems for water distribution pipes have been developed recently that measure the development of leaks and use analytics to prioritize leaks for investigation and repair. Tracking leak indications in both time and space enables water asset owners to target pipe repair crews to the biggest and most important leaks first. Selecting the efficient level of leak detection or monitoring for each water network can be based on an economic evaluation of the cost drivers in each water network, the performance, and price, of leak detection and monitoring solutions. The presentation identifies many of the variables that must be considered when developing a cost-benefit analysis of implementing an advanced leak monitoring system. The model presents includes the notional costs of unplanned shutdowns on water customers and uses some of the water audit's data points such as the variable production cost, cost of emergency repair, environmental impact, and leak detection program management effort. Case studies will provide proposed and actual payback models for three networks in New Jersey, ranging in size from 8 to 80 miles of water mains.

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202 * Wednesday, August 28th, 2019 * 9:30:00 AM
Gian Cossa, DC Water
Big Data, Big Analytics, and Big Decisions

Speaker Bio: Gian has been with DC Water for 6 years and was hired to launch their Asset Management Program. As part of his responsibilities, Gian works across the enterprise to drive Asset Management activities, and support new initiatives and technologies. Currently serving as DC Trustee for CWEA, Gian has also been part of the Tricon leadership since 2015.

Abstract: Too many times we hear stories about organizations collecting bunches of data but with very little clarity into the actionable information and decisions that should flow from such data acquisition. DC Water has been making great strides in collecting data that is analyzed for the express purpose of helping make better decisions. Today's presentation will focus on several initiatives underway at DC Water that demonstrate their commitment to using "Big Data" in robust ways. As part of the original Asset Management Program, DC Water refined their Business Case Evaluation and Capital Improvement Program (CIP) Prioritization tools, which funnel all sorts of data into those decision-making processes. Lastly, there are several initiatives underway utilizing "Big Data" that yield better decisions and those efforts include smart water fountains, pressure transience detection, analytics of waste water treatment, and pipe anomaly detection. Each of the examples above will demonstrate DC Water's commitment to advancing its usage of data, and the subsequent analyses that is possible from such efforts. New technologies and implementing older technologies has allowed DC Water to capture better and more accurate data, which in turn can be used to assist in making better CIP investment decisions and developing more optimal Operations & Maintenance strategies.

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203 * Wednesday, August 28th, 2019 * 9:30:00 AM
Matthew Tabisz, Synagro
Landfills falling out of love with biosolids—what are the ramifications?

Speaker Bio: Matthew Tabisz is a Business Development Manager with Synagro and has been with the company for over five years. He serves on multiple industry association committees including WEF- Residuals and Biosolids and AWWA-Standards Committee on Biosolids. Matthew holds a MBA from the University of Wisconsin and a BS in Biology from the University of Maryland.

Abstract: This presentation will focus on the emerging changes in landfill acceptance of biosolids and how that impacts land application programs particularly in years with significant wet weather. Historically landfills have been a steady, although expensive, outlet for biosolids when land application is not available. In recent years Solid Waste companies have been reducing the level of biosolids they take in due to landfill stability, safety, and odor concerns. This trend coupled with the 2018 extraordinary weather conditions is having a material impact on biosolids management programs in the Mid-Atlantic. Given the record setting precipitation, access to land application was limited for much of 2018. The immediate response to limited land availability was to shift increasing volumes of biosolids to landfills and storage. With the reduction in landfill acceptance, available storage was quickly filled as it was not designed to handle such large volumes. When both landfilling and storage management methods reached capacity, more expensive options were used increasing costs for all stakeholders. In addition to utilizing additional outlets, relief from regulators was sought by both the generators and the contractors. This was met with varying success. The presentation will examine both the financial and logistical impact of biosolids management plans' reliance on landfill when acceptance is reduced and other outlets are constrained. The immediate response, the short-term mitigation efforts, and the long-term planning results will be summarized. As an industry, we must find ways to prepare for such reductions in landfill acceptance and weather events to prevent another strain on resources like 2018. The diversification of outlets is key to future success. The main topics will be: · Why was 2018 weather so different? · -Limits on land application -Landfill acceptance -Storage capacities -Other outlets -Regulatory response -Short-term mitigation -Long-term planning -Est. financial impact (short and long-term)

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204 * Wednesday, August 28th, 2019 * 9:30:00 AM

Katherine Sager, Carollo Engineers

It Takes Two to Model Build: Combining SCADA Data with Operations Staff Knowledge Leads to Efficient Development of a Complex Hydraulic Model

Speaker Bio: Katherine Sager has 5 years of experience in the water and wastewater industry. Her experience includes building, calibrating, and running hydraulic models for various uses focusing on master planning, facility planning, and water quality. She has completed water distribution system modeling studies and master plans for utilities across the country. Ms. Sager is a registered professional engineer in Virginia and Maryland.

Abstract: Building a large complex hydraulic model can be a daunting task. Combining historical SCADA data with operations staff system knowledge was key to efficiently develop a calibrated model for Dallas Water Utilities (DWU). DWU operates a large complex water system containing 5,000+ miles of pipes, 32 tanks, 154 pumps, and 125 pressure reducing valves. DWU's average and maximum system demands are 375 and 612 mgd, respectively; of which 145 mgd is delivered on average to 23 customer cities through 40+ automatically controlled valve connections. The historical SCADA data analysis provided key insights into the controls setup and customer cities demand flows and patterns development (a distinctive feature of DWU's system) in the model. Historical SCADA data was analyzed in coordination with DWU staff to determine optimal pump stations and specific pump operational controls for this extremely redundant system. Because customer city demands have a large impact on systems operations, the detailed historical analysis of SCADA data conducted was critical to closely estimate their flows and demand patterns. The historical SCADA data analysis also provided numerous benefits to DWU operations staff including recommendations for meter recalibration, frequency of pump curve tests, and potential partially closed valve locations. Hydraulic grade line comparisons were completed to identify pressure sensors that should be recalibrated while flow mass balance analyses were completed to identify flow meter recalibration candidates. SCADA data was used to determine actual pump operation points that were then compared to the latest available pump curve tests, some dating back to the 90s. In a few instances this comparison showed that there had been significant pump deterioration since the last pump test, providing justification for a more frequent DWU pump test protocol. SCADA data also revealed partially closed valves (e.g., at a tank inlet where operations had typically struggled to fill).

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205 * Wednesday, August 28th, 2019 * 9:30:00 AM

Alex Palmatier, HDR

The New P in Your Collection System Maintenance Program; Predictive Maintenance

Speaker Bio: Alex Palmatier is a Project Manager with HDR with 18+ years of experience. For better or worse, much of my experience over the past 18 years has been in support of wastewater agencies. This makes me super popular at dinner parties. My wife loves it when the topic of work comes up. Whether it's strategic planning, improving efficiency and effectiveness, developing and implementing proactive SSO reduction programs, or providing support during enforcement, if it involves sewer systems that's what I love to do. Who needs a hobby when poop is your life?

Abstract: The primary maintenance activity for wastewater collection systems is often gravity sewer cleaning. This is a labor intensive process and typically comprises the majority of collection system operations activity on an annual basis. Standard wastewater collection system cleaning programs consist of three main components: Reactive, Preventative, and Proactive cleaning. Of these cleaning types, only Preventative targets assets that have identified as at-risk of a compliance event. Preventative cleaning uses historical data to represent future behavior, but this assumption is not necessarily true as variation in asset condition, veracity of collected data, usage patterns, and environmental conditions change over time. Due to limitations in historical data, approximately 70% Preventative and Proactive cleaning is typically prescribed to assets that do not require maintenance. By instituting a fourth type of cleaning – Predictive – utilities monitor current asset performance and use data representative of actual conditions to make determinations about cleaning demand. Pilot studies have shown up to a 90% reduction in cleaning demand for high-frequency pipes when converting from Preventative cleaning to Predictive cleaning strategies. Predictive cleaning strategies achieve higher efficiencies by actively monitoring system conditions and making determinations on current system data to supplement historical data. Monitoring strategies can include visual inspections, rapid assessment tools such as acoustic assessment, or remote sensing technology such as non-contact level sensors. The result is lower cleaning costs for utilities and reduced wear on infrastructure caused by unnecessary maintenance. Currently, HDR is piloting a predictive cleaning program within the Winston-Salem Forsyth County wastewater collection system. This pilot involves the collection of human and sensor data in the field. Predictive cleaning strategies including monitoring through non-contact level sensors, SL-RAT acoustic assessment technology, pole camera, and visual inspection have all been deployed. This data is monitored and used to determine cleaning schedules for assets only when needed. Initial results indicate a significant reduction in cleaning demand when converting to a Predictive cleaning approach. By exploring pilot program data, HDR is currently developing standardized logic that triggers the scheduling of assets for preventative cleaning based on remote sensing data. This will allow for larger scale deployment of inspections and remote sensors within the collection system and partially-automated monitoring of collected data.

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201 * Wednesday, August 28th, 2019 * 1:00:00 PM
Gage Muckleroy, GHD
Rivanna Water and Sewer Authority (RWSA) Asset Management Program

Speaker Bio: Gage has more than 30 years of engineering and asset management consulting experience focused on water and wastewater systems. He leads GHD's US water utility sector asset management team and is a recognized national thought leader in asset management. Gage has led numerous workshops, training sessions, and presentations on asset management. He has helped clients incorporate asset management approaches to the stage that they become normal business practice. Gage holds a Bachelor's degree in Civil Engineering from Texas A&M University and a Masters from Johns Hopkins University.

Abstract: The Rivanna Water and Sewer Authority (RWSA) provides wholesale water and wastewater services to a population of approximately 110,000 in the City of Charlottesville and Albemarle County Virginia. RWSA has identified asset management as a priority in its 2018 Strategic Plan to address challenges associated with managing, operating and maintaining RWSA's wide range of infrastructure. RWSA recognizes the importance of using asset management as a practice to minimize the total cost of owning and operating their assets taken service levels and risk into account. RWSA is developing a Strategic Asset Management Plan (SAMP or Roadmap) that will become part of its on-going business practice. The primary objectives of the SAMP are as follows: 1) The SAMP is guiding document ("Roadmap" or "checklist") for implementing the AM framework; 2) The AM framework needs to be concise and address capital planning and operations and maintenance needs for both water and wastewater infrastructure; 3) The SAMP serves as a business case for implementing an AM program; 4) The development of the Roadmap assists in aligning RWSA staff in the same direction; 5) The approach to the AM framework and roadmap development considers staff availability with sensitivity to already full workloads; and 6) The implementation plan and roadmap emphasizes and supports RWSA staff leading the implementation with appropriate coaching, guidance and technical support. This presentation will review the results of the SAMP and discuss the resulting Roadmap (implementation strategy) including findings and conclusions. The presentation will also present lessons learned and approach strategies for success and managing leading change including: 1) using a concise "fit-for-purpose" framework; 2) knowledge transfer from consultant team to RWSA; and 3) leading and managing change along the journey.

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202 * Wednesday, August 28th, 2019 * 1:00:00 PM
Veronica Aponte, U.S. Environmental Protection Agency
Don't Wait for a Disaster. Be Prepared to Manage a Contamination Incident

Speaker Bio: Veronica Aponte is an Environmental Engineer Research Fellow at the Environmental Protection Agency's Office of Water, Water Security Division. She is working on the development of technical documents for the water sector that focused on the remediation and clean-up phase following a contamination incident. The documents are part of the efforts to support water utilities with prepare, detect, respond and recover from a contamination incident. Veronica has a PhD in Environmental Engineering from the University of South Florida.

Abstract: U.S. EPA's Water Security Division has developed a web-based interactive tool entitled "Decontamination Preparedness and Assessment Strategy (DPAS)". The tool facilitates emergency preparedness for Chemical, Biological, and Radiological (CBR) contamination incidents for water utilities. Drinking water and wastewater systems face major challenges when confronting a CBR contamination incident, whether accidental or intentional. These challenges include isolating and treating contaminated water, as well as decontaminating water utilities' infrastructure to enable its recovery and return to service. The remediation and recovery process of a water utility following a contamination incident will vary on a case-by-case basis. Therefore, water utilities and responders require decision-making tools that can be adapted to specific incidents as appropriate. To address these challenges of the Water Sector, DPAS was developed. This presentation will highlight DPAS. It walks the user through the three phases of remediation, namely characterization, decontamination, and clearance of an already identified contaminant. In addition, DPAS includes worksheets/ templates for the user to populate and generate a remediation strategy document that they can used to respond to a contamination incident. It also provides information on the progression of roles and responsibilities, and identifies resources that support remediation efforts. By using DPAS, water utilities will be able to: (1) learn the steps of the remediation process so that the sequence of events can be efficiently followed if a contamination incident occurs; (2) identify utility-specific actions that can be taken prior to a contamination incident to increase preparedness for an effective response; (3) understand the resources and other tools available to help prepare for and respond to a contamination incident; (4) increase awareness of important public health and environmental safety considerations for each step of a remediation effort; and (5) develop a detail remediation strategy that can effectively enhance their preparedness in response to a contamination incident. DPAS can aid water utilities in addressing gaps that will result in enhancement of their emergency preparedness to response to contamination incident. Preparedness is a key strategy to improve response and decision-making during a contamination incident, resulting in a reduction of detrimental impact.

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203 * Wednesday, August 28th, 2019 * 1:00:00 PM

Greg Knight, Black & Veatch

FINDING THE RIGHT SOLUTION FOR PHOSPHORUS HARVESTING: A RISK BASED APPROACH TO THE EVALUATION OF PROCESS ALTERNATIVES

Speaker Bio: Greg is an experienced Process Engineer with 18 years history in the water industry working on water, wastewater and biosolids projects. As well as working as an Engineer for Black & Veatch for 13 years, his previous roles have included Plant Manager of a large potable water treatment plant in the UK and 3 years Voluntary Work in Ghana with Voluntary Service Overseas (the UK equivalent of 'Peace Corps'). Greg has an MSc in Environmental Engineering, a BSc in Physics and a Professional Post Graduate Diploma in Water Treatment Management.

Abstract: Enhanced biological phosphorus removal provides a cost-effective strategy for removal of phosphorus in water reclamation facilities. However, the process presents challenges associated with biosolids treatment and end use. These include the production of unwanted struvite in digesters and downstream dewatering equipment, high recycle phosphate loads from dewatering systems, poor dewaterability of biosolids, higher polymer demands for final dewatering, higher phosphorus release rates from biosolids being land and a phosphorus-nitrogen imbalance in biosolids being used for fertilizer. Targeted recovery of phosphorus from biosolids or filtrate / centrate systems has the potential to mitigate the above issues, while also providing marketable fertilizer products. Various vendor solutions are available to remove phosphorus at different locations in the treatment stream by precipitating phosphorus salts. These include Ostara Pearl™, Multiform Harvest™, CNP Airprex™, Schwing Bioset Nuresys™ and CNP Calprex™. Numerous evaluations have been completed looking at the economics of phosphorus recovery technologies. However, the evaluation of alternatives requires a number of assumptions to be made, around which there is significant uncertainty. A range of documented performance outcomes has led to some hesitancy for technology application. Parameters of uncertainty include improvements in dewaterability, reductions in polymer consumption, chemical dosing requirements, revenue from the product (if not guaranteed) and the efficiency of P recovery. A systematic evaluation of the uncertainty associated with the life cycle cost outcome of the different technology alternatives, using a monte-carlo type analysis will be presented. This will be based on experience from several facilities where B&V has been involved with the evaluation, design, and installation of phosphorus recovery systems. This will provide the audience with a sense of the major drivers that play a role in the justification of phosphorus harvesting technologies. The evaluation will show the impacts of different operating cost assumptions on the life cycle cost outcome for various phosphorus recovery systems. The presentation material will include probability distributions for life cycle cost outcomes and "tornado diagrams" showing which variables have the most impact on life cycle cost. The analysis will show the following impacts. Impact of ferric dosing to centrate on system payback: the amount of ferric chloride required for sidestream mitigation has a large impact on biosolids based phosphorus harvesting payback, indicating that robust estimation with either full-scale testing or simulation work is required to properly estimate the system payback. Impact of phosphorus recovery rate and value on biosolids harvesting payback: The amount of product recovered, and the value of that product, has a relatively small impact on the payback of biosolids based phosphorus recovery systems. The impact of savings versus revenue generation: reduction in biosolids handling and chemical addition outweigh any net benefits of struvite revenue, and the inclusion of these benefits has a significant impact on the payback period associated with harvesting technologies. Evaluation of phosphorus harvesting that includes performance variability and uncertainty helps to identify the key drivers for implementing different harvesting technologies. These results, when examined across multiple facilities, provide a clearer picture of the major drivers for phosphorus harvesting at facilities.

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204 * Wednesday, August 28th, 2019 * 1:00:00 PM
Carrie Kruger, Duffield Associates, Inc.
A Towering Achievement

Speaker Bio: Ms. Kruger is a Professional Engineer with more than 17 years of experience and is a project manager at Duffield Associates. As project manager, responsibilities have included all aspects of project tasks from the engineering services agreement to planning, design, bid phase and construction phase services. Municipal Projects have included water and wastewater systems design, NPDES permit review, asset management, storm water general operating permits, and water and wastewater master plan development.

Abstract: Duffield Associates, Inc. (Duffield) was selected by The Town of Millsboro to provide planning phase, design phase, bid phase, and construction phase services including construction inspection for its elevated storage tank raising project. Due to a third-party error, the Town of Millsboro's 500,000-gallon spheroid elevated storage tank was installed with an overflow elevation 5'-6" lower than its other two tanks. The elevation difference created a separate water distribution pressure zone within a housing development that will contain greater than 2,400 dwelling units at build-out. The Town attempted to correct the problem with altitude and control valves, but was still unable to make use of the full capacity of the storage tank. The Town concluded that the tank had to be physically raised to eliminate the separate distribution pressure zone. Prior to the tank raising work, Duffield visually inspected the concrete foundation of the tank. Pittsburg Tank and Tower Group (PTTG) was contracted to inspect the tank to identify improvements that could be completed under the tank raising contract. The inspection included: the concrete foundation, riser pipe, overflow pipe, interior dry coating, interior wet coating, exterior wet coating, safety features, and roof openings such as the access tube, roof vent, and bowl access hatch. The elevated storage tank interior bowl was inspected using a diving camera. Duffield represented the Town during the inspections, reviewed the diving video and inspection reports, and made recommendations on improvements to be added to the tank raising contract. Duffield prepared tank profiles, observed topographic surveys and tank measurements, and calculated the tank raising height. Key elements to the project success included finding an experienced contractor, review and inspection of tank raising and welding procedures, and daily safety meetings. The tank was successfully raised and the Town now has full capacity of the tank.

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205 * Wednesday, August 28th, 2019 * 1:00:00 PM

Edward Talbot, OBG, part of Ramboll

Pump Vibration and Surge Investigation at Critical 460-MGD Combined Sewage Pumping Station

Speaker Bio: Mr. Talbot has more than 18 years of experience in municipal water and wastewater engineering. As a Project Manager for OBG, part of Ramboll, he has designed and overseen construction of a number of enhanced nutrient removal (ENR) wastewater facilities in the Chesapeake Bay watershed. Mr. Talbot graduated from the Georgia Institute of Technology with a BS in Mechanical Engineering and the Johns Hopkins University with a MS in Environmental Engineering. He is a registered Professional Engineer in the State of Maryland and District of Columbia.

Abstract: A critical combined sewage pumping station in a major metropolitan area has experienced hydraulic issues for many years that limited pumping capacity. The last upgrade project at the station attempted to address undesirable suction conditions identified as the root cause of the problems to reach a NPDES required firm capacity of 460-MGD. However, additional problems have arisen relative to vibration and surge at the station that required further action. This presentation will first review the findings of a detailed investigation into excessive vibration reported with three 1,750 HP variable speed pumps that have challenged O&M staff to maintain firm capacity. The investigation included independent vibration testing to confirm the magnitude of the vibration problem; a hydraulic testing program to identify any NPSH concerns and confirm operation as designed; a thorough review of operating logs and SCADA data to map any historical operating trends; and lastly, a condition assessment by the pump manufacturer to determine useful life of the pumps given the vibration and any preventative rehabilitation required. A finite element analysis of the pumping assembly is planned to identify long term solutions to buffer vibration at critical frequencies. Second, the station experienced two documented surge events in 2018, including one that burst apart a 54” coupling on one pump discharge. A surge model was developed, and results of this analysis and resulting capital improvements to prevent future surge events will be presented. Finally, this presentation will discuss short-term operational adjustments made to lessen the impact of vibration and surge on the reliability of the station. These include modifications to PLC programming to provide more flexibility in sequencing of pump operation, vibration trip points, and speed ranges. Furthermore, improvements were implemented to Standard Operating Procedures (SOP) to give operators more direct control over pump operation during wet weather events.

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206 * Wednesday, August 28th, 2019 * 1:00:00 PM

Rebecca Winer-Skonovd, Biohabitats

Second Mouse Gets the Cheese – Maryland Phase II MS4s Should Benefit from Phase I Experience

Speaker Bio: Rebecca Winer-Skonovd is a Senior Scientist with Biohabitats with nearly 20 years of experience in stormwater management and watershed planning. Rebecca provides support for state, local and federal clients related to stormwater permitting and compliance, in addition to TMDL and watershed-based planning, public outreach and regulatory coordination.Rebecca has a BS in environmental science from University of Maryland, College Park and a MS in Community Development from UC Davis.

Abstract: Over the past 5+ years, Maryland NPDES MS4 Phase I communities (Phase I MS4s) have worked diligently to address an ambitious permit requirement tied to the Chesapeake Bay TMDL: restore 20% of currently uncontrolled impervious surfaces. Several Phase I MS4s have adopted a watershed-based approach towards meeting the 20% restoration requirement. This is particularly relevant for Maryland NPDES MS4 Phase II communities (Phase II MS4) as they are now faced with addressing the same 20% restoration requirement within their own communities, but often with less staff, budget, and other critical resources. This presentation will review lessons learned from the experiences working with multiple Maryland Phase I MS4s including Montgomery County, Howard County, Baltimore County, Baltimore City, and Anne Arundel County. Lessons learned will review the value of a watershed-based approach, cost-effective restoration techniques, and methods for calculating baselines and accounting for previously restored impervious surfaces. This presentation will focus on aspects and adaptions that may be more relevant to Phase II MS4s who have access to limited resources such as software, GIS data, and staff.

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201 * Wednesday, August 28th, 2019 * 1:30:00 PM

Russ Dalton, Hazen and Sawyer

Putting Your Money Where Your "Need" Is: Implementing an Asset Management - Driven CIP Framework

Speaker Bio: Russ Dalton earned his Bachelor of Science in Civil Engineering from Virginia Tech and Masters of Engineering in Project Management from the University of Maryland - College Park. Mr. Dalton is a licensed professional engineer in Virginia, Maryland, Delaware, and DC, and earned his Project Management Professional certification in 2018. He has spent the last 10 years with Hazen and Sawyer, working primarily in the areas of sewer condition assessment, rehabilitation, and design, and asset management.

Abstract: Newport News Waterworks desired a best-in-class CIP project prioritization process that ensures a rational and sustainable CIP while responding to the business needs of both Waterworks and its key stakeholders. Waterworks has implemented an integrated, triple-bottom-line based business case evaluation-focused capital planning and prioritization process fostering a culture of collaboration & communication and created improved trust, understanding, and transparency throughout the organization. Waterworks is a regional water provider and serves over 400,000 residents in the Hampton Roads area. Waterworks owns and operated two WTPs and a distribution network (2,000 miles) including raw & finished water pumping infrastructure. This presentation will describe the business case evaluation approach to capital prioritization and planning that Waterworks developed in 2018. This business-oriented financially-driven CIP planning process focused on project prioritization through the use of detailed business case analysis and the utilization of cross-functional teams to ensure a balanced perspective on capital planning and infrastructure management issues necessary to drive organizational change. The policies, procedures, and processes designed as part of this effort helped to ensure that optimal capital projects were selected and implemented consistent with quality asset management practice. Documentation & extensive staff training of the business case evaluation methodology ensured that this methodology was utilized in a consistent manner across all Divisions of the organization. This project included numerous workshops with stakeholders from across the organization to ensure that all perspectives were considered in the evaluation and prioritization of capital projects. The Triple-Bottom-Line framework enabled the business case evaluation methodology to evaluate all capital projects through a social, environmental as well as financial lens. Key outcome of the effort was the development of a well-defined methodology and process through which Waterworks can plan and update its CIP on an ongoing basis using the tools, templates, and techniques learned and applied throughout the project.

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202 * Wednesday, August 28th, 2019 * 1:30:00 PM
Matthew Ries, DC Water
Sustainability at DC Water: Time for a Refresh

Speaker Bio: Dr. Ries is the Director of Sustainability & Watershed Management at DC Water. Previously, he was the Chief Technical Officer at WEF. Before that, he worked as a consultant to municipal and industrial water, wastewater, and stormwater facilities. He was also on the Board of Directors of Alexandria Renew Enterprises. Dr. Ries has a BS, MS, and PhD in Civil/Environmental Engineering from Valparaiso University, the University of Notre Dame, and the University of South Florida. He is a registered PE.

Abstract: Refresh: “to become fresh or vigorous again; revive” (Dictionary.com). As stated in its previous strategic plan, Blue Horizon 2020, DC Water’s vision was “to be a world-class water utility.” A value of “vigilance” required “attend[ing] to public health, the environment, quality, efficiency, and sustainability of our enterprise.” Arising from this strategic plan, DC Water took great strides advancing sustainable practices: the largest thermal hydrolysis project in the world, producing electric power and heat; a new LEED Platinum headquarters built over previously undevelopable land and utilizing sewer heat recovery and rainwater reuse; and the integration of green infrastructure to offset gray tunnels for CSO abatement; among others. In late 2018, DC Water realigned senior staff and launched a new 2-year strategic plan, “The Blueprint.” Accordingly, DC Water is refreshing its sustainability efforts, prioritizing and aligning a variety of programs and projects around a common understanding of sustainability. Additionally, the measurement and reporting of sustainability performance is being established along with other enterprise-wide efforts in a new Enterprise Performance Management (EPM) division. An inherent challenge with the concept of sustainability is the lack of an agreed-to definition for the water sector. It means different things to different people. However, the triple-bottom-line framework for sustainability is well-established and served as a basis for DC Water’s refresh of its sustainability program. A working definition for a "sustainable utility" drew upon doctoral research on the topic and added the concept of resiliency and emphasized the inter-generational timeframe. “A ‘sustainable utility’ is resilient and will provide its crucial services today and into the future, protect public and environmental health, and enable economic growth, all while minimizing resource consumption and not creating liabilities for future generations.” EPM staff are conducting enterprise-wide online surveys and face-to-face interviews of executive staff to receive input on (1) the benefits of being a sustainability utility, (2) the most important current and potential sustainable practices for DC Water, and (3) measuring sustainability. Established, anthropological methods are being used to analyze input. Survey results are being analyzed using freelisting, a technique that gathers data by asking participants to list items on a given topic, which are analyzed to create a “cultural domain” on the topic. Interviews are being evaluated using discourse analysis, a method which converts qualitative interview transcripts into quantitative data using theme coding and re-coding processes. Top results from the surveys and interviews will be compared and contrasted to establish high-priority sustainable practices for DC Water along with measurement methods. The surveys/interviews are ongoing and preliminary results indicate an inclination to separate the distinct, but occasionally-overlapping issues of resilience and sustainability. Also, a wide-variety of perspectives are arising with convergence emerging around energy/resource recovery and affordability issues. Data-gathering will conclude in January 2019 with analysis and development of a sustainability strategy in spring 2019. This will be followed by data-gathering and establishing a baseline with results available in summer 2019.

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203 * Wednesday, August 28th, 2019 * 1:30:00 PM
Caroline Nguyen, WSSC
Inline Enhanced Biological Phosphorus Removal at WSSC

Speaker Bio: Caroline Nguyen has a BS degree in Environmental Engineering from NC State University, an MS in Environmental Engineering from Virginia Tech, and a PhD in Civil/Environmental Engineering from Virginia Tech. She has been with the Washington Suburban Sanitary Commission (WSSC) for 8 years, and in the past few years has been working on research and innovation efforts for the organization's treatment plants. She has previously worked for Hazen and Sawyer and GHD/Stearns and Wheler.

Abstract: The Washington Suburban Sanitary Commission (WSSC) Water Resource Recovery Facilities (WRRF) have stringent phosphorus limits, and the WRRFs use a lot of aluminum sulfate (alum) to precipitate and remove the solids. Biosolids with a lot of alum has been shown to have reduced digestibility and biogas production based on pilot testing using WSSC's solids. In addition, phosphorus resources will become more limited in the future, and the ability to extract and produce a marketable phosphorus fertilizer from biosolids are likely to become more attractive. Therefore, as a long-term strategy to address these issues and to reduce the chemical operating costs, WSSC is investigating enhanced biological phosphorus removal (EBPR) strategies that can be implemented at all of WSSC's WRRFs. One of the innovative EBPR approaches is to ferment the mixed liquor suspended solids in-line within the existing reactor basin, which is an economical way to use the existing treatment volume for biological phosphorus removal. The presentation will describe this approach at the 26 mgd Seneca WRRF, which began testing at full-scale in the spring of 2017. The plant's performance will be highlighted including the alum use reduction and other benefits of the operational change. Some challenges have also been encountered with the mixing strategy and ferric chloride addition, which will also be discussed. The plant staff has considered additional ways to improve the EBPR process using existing infrastructure, and WSSC is evaluating sidestream EBPR at full-scale at the Parkway WRRF. The next steps in WSSC's phosphorus evaluation will also be shared.

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204 * Wednesday, August 28th, 2019 * 1:30:00 PM
James O'Shaughnessy, Arcadis
Putting Retired Quarries Back to Work

Speaker Bio: James is a senior water engineer with Arcadis focusing on water and wastewater infrastructure. He holds BS and MS in Civil Engineering from Virginia Tech and is a registered professional engineer in the Commonwealth of Virginia.

Abstract: The resiliency of municipal water supplies is increasingly under pressure from climate change and increased demand due to growth of communities. The development of raw water storage is an effective means to provide additional water supply resilience. However, construction of new riverine reservoirs is costly and presents numerous environmental and regulatory challenges. Repurposing retired rock quarries to provide raw water storage can be a cost-effective alternative to meet water supply needs. This presentation will discuss the planning and design challenges associated with the conversion of a retired rock quarry located in Ashburn, VA into a water supply reservoir. The Potomac River is the primary water supply for Loudoun Water's recently constructed Potomac Water Supply Program. To provide drought protection for the water supply, Loudoun Water is converting a retired rock quarry into the Quarry A Water Supply Reservoir. When complete, the reservoir will provide greater than 1.0 billion gallons of offline raw water storage capacity. During periods of high flow within the Potomac River, raw water from the river will be stored within the reservoir. Critical design elements for the project included water quality considerations and the infrastructure required to support filling and withdraw from the reservoir. Water quality is an important consideration for all reservoirs supplying drinking water treatment plants. Water quality modeling supported the selection of fill and withdraw locations within the water column to minimize the need for chemical addition and reduce treatment costs. To further reduce treatment costs at the water treatment facility, the quarry water supply will be utilized during adverse water quality events (eg. high turbidity) on the Potomac River. A raw water pumping station is proposed to support the filling and withdraw from the quarry. A 25-ft diameter shaft approximately 280-ft in depth sitting below the pumping station building will be connected to the quarry via tunnels. The shaft will house submersible vertical turbine pumps hung from the pumping station slab above. The pumps were selected to provide efficient coverage over the potential 200-ft elevation change between the reservoirs normal pool and low water level. When completed, the proposed reservoir and raw water pumping station will increase Loudoun Water's drought resilience and reduce treatment costs during adverse water quality events.

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205 * Wednesday, August 28th, 2019 * 1:30:00 PM

Anna Kazasi, Arcadis US

Brentwood Park Sewage Pump Station Improvements: Tales from the Crypt

Speaker Bio: Anna Kazasi has served as an Environmental Engineer for eight (8) years in Greece and the US. Her experience as an engineer lies in the areas of water, wastewater, solid waste, and sustainability. She received her undergraduate degree in Chemical Engineering and her Master's in Environmental Protection and Sustainable Development from Aristotle University, Greece. She earned a second Master's in Environmental Engineering from Virginia Tech. She is a Professional Engineer in Maryland and a certified Envision Sustainability Professional.

Abstract: Aging infrastructure built with little consideration to operation and maintenance (O&M) can pose serious challenges to operators. When it is time to upgrade an asset, owners can take the opportunity to improve the O&M aspect during the design phase. This presentation will discuss the challenges associated with O&M of an existing pump station and the planned improvements to address them while keeping the pump station operational during upgrades. The Brentwood Park Sewage Pump Station (SPS) was constructed in the 1980's and is owned and operated by Harford County. O&M of the existing pump station are difficult due to confined and insufficient work space within the station. Some of the challenges with the existing pump station are as follows: pump controls are located at the depth of 25 feet; narrow entrance and deep drywell vault; insufficient ventilation and confined space issue; insufficient capacity to meet short-term future needs; its location on a small parcel close to a residential neighborhood. t comprises a dry-well/wet-well with two dry-pit submersible pumps, operating in a duty/standby configuration. The purpose of the project was to replace the existing pumping system with self-priming, suction lift pumps. The new pumps are located only ten feet below grade with enhanced safe access for O&M personnel. The design capacity for the pumping system was increased to 864 gpm to account for the short-term future growth. The SPS improvements utilize the existing wet-well and include a control building on top of the new dry well within a very limited area. The new pumping system is provided with variable frequency drives, control panels and instrumentation, including a magnetic flowmeter and a chart recorder. A new HVAC system for proper ventilation of the control building and the dry well was also included in the design. The existing 240 VAC electrical supply could not support the new pump station equipment and modifications. As a result, the electrical service was upgraded to 480 VAC. Due to the proximity to residential housing, a new backup generator with sound attenuation enclosure is included. The SPS will operate automatically in a lead/lag mode based on levels within the wet well and will be remotely monitored. Harford County would like to get the improvements done while the SPS always remains operational; hence, a bypass pumping system will facilitate maintenance of operations during construction. The project team developed three layouts, which were screened in terms of their ease of constructability, operational features, maintenance and reliability of components, and opinion of probable cost. Eight manufacturers of suction lift pumps were solicited for this project. Due to the high required total dynamic head (TDH), some of the manufacturers were unable to provide appropriate pump selections. In summary, this project addressed several pump station issues, including the site's proximity to residential homes, limited site area, ease of O&M, the pump selection for the high TDH, the development of the construction sequence to allow uninterrupted operation, and electrical system upgrades.

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206 * Wednesday, August 28th, 2019 * 1:30:00 PM

Bill Meinert, OBG, a part of Ramboll

A Zero Sum Game? Testing out the new Maryland Nutrient Trading Program

Speaker Bio: Bill Meinert is a Vice President at OBG, part of Ramboll. He has 30 years of water / wastewater consulting experience, and a BSCE from University of Notre Dame and MSCE & MBA from University of Pittsburgh. Bill manages wastewater and nutrient reduction programs and projects for clients throughout the region.

Abstract: Maryland does not yet have an official nutrient trading program. In Summer 2018, regulations to develop a nutrient trading program were published in the Maryland Register (Effective Date: July 16, 2018). The Maryland Department of the Environment (MDE) is starting to reference this pending program in local Municipal Separate Storm Sewer Discharge Permits (MS4 Permits). In tandem with the nutrient trading program development, MDE is drafting Phase III Watershed Implementation Plans (WIPs) for the local jurisdictions throughout the state, and should be effective by Tri-Con 2019. The updated Phase III WIP goals will likely reduce existing Phase II goals, and overall compliance (both state-by-state throughout the Chesapeake Bay Watershed, and within local Maryland jurisdictions) and may influence point and non-point discharge compliance in the future. Since most of Maryland's large wastewater treatment plants (WWTPs) have been upgraded to Enhanced Nutrient Removal (ENR) and many jurisdictions now have MS4 permits as a part of Phase I and II WIP goals, local jurisdictions will likely start turning to the proposed trading program as they work to meet Phase III WIP goals. Some entities have already started investigating ways to utilize the nutrient trading program regulations. For instance, Baltimore County was recently granted a modification to its MS4 Permit to use Maryland's "newly authorized trading program" as an option to meet its 20% impervious surface restoration requirement. A local industry must find a solution to its new Industrial Storm Water Discharge Permit (through Maryland's General Permit No. 12-SW) requiring a TN reduction. Anne Arundel County and Howard County are assessing non-point and on-site disposal system (septics) reductions in concert with on-going WRF ENR performance. This presentation will review the published nutrient trading program regulations, with an eye on how this program may (or may not) be used to efficiently meet point and non-point source nutrient reduction requirements with real-world examples explored over the past two years, and, how high performing jurisdictions may generate additional funding for programs that are reducing nutrients beyond their required goals. Specific requirements for credit generation and use, including a review of trading regions, Edge of Tide (EoT) ratios, and impaired water limitations will be included. Beyond the information in published regulations, a review of innovative ways to utilize the system, as well as a list of key questions to consider when evaluating a potential project will also be reviewed.

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201 * Wednesday, August 28th, 2019 * 2:00:00 PM

Prasad Manthena, Greeley and Hansen LLC

Streamline Green Infrastructure Asset Management – A Case Study of DC Water Mobile-Based Asset Management System

Speaker Bio: Prasad Manthena is with Greeley and Hansen and is currently Project Manager for asset management team at DC Water's Clean Rivers managing Long Term Control Plan implementation. Prasad has experience in asset management, sanitary sewer rehabilitation, wastewater treatment plant design, and water and wastewater modeling. He has a Master's Degree in Civil Engineering from the University of Kentucky.

Abstract: The DC Clean Rivers (DCCR) Project at DC Water and Sewer Authority (DC Water) is part of a Federal consent decree for reduction of nitrogen, reduction of combined sewer overflows and flood relief in the Anacostia and Potomac Rivers and Rock Creek. The program initially included tunnel systems and associated structures (grey infrastructure) to capture wet weather combined sewer overflows. The consent decree was amended to include green infrastructure (GI) to manage a 1.2" storm event over 498 impervious acres in the Rock Creek and Potomac River sewersheds within the District of Columbia. To meet this challenge, DCCR constructed over 200 GI facilities (16 different practice types) to manage stormwater and to mitigate flooding. The project team identified the need to implement a mobile-based asset management system to capture asset data including maintenance information for the GI facilities. DC Water utilizes IBM Maximo as its core product for its work order management system. Traditional solutions included using paper-based forms to capture and collect information on maintenance performed on the GI facilities for reporting and creating follow-up work orders. With limited resources, this traditional approach would consume most of the project resources transferring the paper information into Maximo system after the field work is completed. The solution utilized by DCCR at DC Water includes the mobile-based Maximo Anywhere application. This mobility product solution includes utilizing a tablet to capture field information in real-time into a forms-based system that can sync the data into Maximo Server at regular intervals. Progress to date includes full development of this solution including data gathering requirements and developing a GI asset classification system. This system was implemented to integrate GI assets into geographic information system (GIS) and Maximo. Integration of the assets also included developing the process for work order management and developing job plans. Development of the solution required additional systems including virtual private network (VPN) and security provisions for DC Water. Full integration of the GI facilities has been accomplished by developing asset classifications, job plans, and asset work order classifications that included the set of information to be gathered and responded to by the user. Future tasks include development of required asset classification for any new GI practice types and developing related data collection information.

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Dan Tobocman, OBG

When a Sprint Becomes the Hurdles: Design of the Kenilworth Avenue Stormwater Pumping Station

Speaker Bio: Dan Tobocman is a project manager for OBG, part of Ramboll. He has been an engineer in the water industry for 30 years focusing on wastewater treatment, water treatment, and pumping stations. He has a BS in Civil Engineering from the University of Michigan and an MS is Civil & Environmental Engineering from Stanford.

Abstract: The complete design of the Kenilworth Ave. Stormwater Pumping Station Rehabilitation was finished in five months despite several hurdles. The design replaces worn out equipment and greatly improves the safety and accessibility of the electrical and control equipment. Design projects that comply with DC Water standards typically take a year or more. The aggressive design schedule was needed to accommodate the construction schedule established by the District of Columbia Department of Transportation and DC Water. This presentation will describe the project management changes that were successfully executed to meet the schedule. 1. Weekly progress conference calls to allow all the stakeholders to identify, discuss, resolve and track issues as soon as they arose. The participation of DC Water operations staff in these calls was vital. 2. An action item tracker that focused on active tasks. The details and features of the tracker will be presented. 3. Elimination of the Intermediate Design submittal that is usually required on DC Water projects. The elements of the Intermediate Submittal were either moved to the Preliminary Design, delayed to the Pre-Final Submittal, or eliminated altogether. 4. Reduction in the standard review time from four weeks to two. The design included an innovative change in concept to improve the safety of the pumping station. The existing station has an operating floor directly above the wet well with NEMA 1 electrical and control equipment. There is grating to allow removal of the submersible pumps. Although this layout was allowable when the station was constructed 65 years ago, today it violates the NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities. Because the operating floor cannot be separated from the wet well, the entire station is classified Class I Division 2. The new design places all the electrical and control equipment outside the station in the median of DC-295 to remove ignition sources and avoid the cost of classified equipment. This will also allow DC Water staff of operate and maintain the equipment without entering a confined space. The design also faced a hurdle when the pumping capacity of the existing pumps could not be confirmed. DC Water could not find any record of the pump curves or serial numbers. The pumping station was built as part of a District Department of Highways project. This project included a wet well entry to obtain the nameplate information, but the nameplates could not be found. After the wet well entry was completed, OBG designed and executed a pump test to measure the pumping rate. In the end, DC Water and DDOT received a safe, effective design on time and on budget because of good project planning and execution.

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Robert Andryszak, RK&K
Design and Start-Up of the Patapsco WWTP ENR Facility

Speaker Bio: Bob Andryszak is a wastewater treatment plant design engineer with RK&K in Baltimore, MD. He has assisted with the design of numerous BNR and ENR facilities in the Chesapeake watershed. He served as RK&K's Project Manager for Baltimore's ENR upgrade of its Patapsco Wastewater Treatment Plant.

Abstract: Baltimore City owns and operates the 81 mgd Patapsco Wastewater Treatment Plant which it upgraded to achieve enhanced nutrient removal (ENR) under multiple contracts totaling $250 million. This presentation will review process design parameters and testing, start-up and ENR performance from May 2018 to July 2019. This is the largest U.S. facility utilizing biological aerated filters (BAF) with denitrification filters (DNF) to achieve ENR. Prior to implementing ENR, treatment consisted of grit removal, screening, primary clarification, high purity oxygen (HPO) reactors with secondary clarification, chlorination, dechlorination and post aeration with discharge to the Patapsco River. Sludge was processed by gravity sludge thickening followed by heat drying/pelletization. Attempts to nitrify in the HPO reactors were unsuccessful which was attributed to an unidentified inhibitor in the wastewater. Pilot testing demonstrated BAFs treating the HPO clarifier effluent fully nitrified and Kruger's Biostyr BAF was selected. DeNora's downflow, attached growth, sand filter with supplemental methanol feed was selected to achieve denitrification following the BAFs. The BAF and DNF technologies were selected primarily because each had high allowable loading rates, enabling them to fit on the available site which was severely constrained in size. The BAF design loading range was 18.3 - 45.9 lbs ammonia/1000 cf of media/day, apportioned among 22 cells, resulting in a structure footprint of approximately 61,300 sf, included appurtenant equipment. The DNF design loading rate was 44.3 lbs nitrate/1000 cf of media/day apportioned among 34 cells, resulting in a structure footprint of approximately 72,000 sf, including appurtenant equipment. The HPO effluent flow pattern and waste loadings were characterized. Key process considerations were: 1) the ENR system would treat up to 150 mgd, 2) BAFs would be used for nitrification and not reducing BOD, 3) the degree of nitrogen removal historically achieved in the primary clarifier and HPO processes was maintained, 4) BAF process stability was maximized by conveying BAF backwash solids to the sludge processing system, 5) BAF and DNF backwash solids should be concentrated before being conveyed to the sludge processing system, 6) phosphorus would be removed mainly in the primary clarifiers and HPO secondary clarifiers by multi-point ferric chloride addition, and 7) provision for a phosphoric acid feed system to prevent low-phosphorus inhibition in the DNFs in the event of upstream ferric chloride overdosing. BAF process testing started in May 2018 and ammonia concentrations less than 1.0 mg/l were achieved in June and maintained through early August when there was a major upset in the plant's sludge processing system which took approximately two months to resolve. Nitrification was resumed in early October 2018 and effluent ammonia averaged 1.01 mg/l to date. DNF process testing started in October 2018, and through December 2018, nitrite/nitrate concentrations could be maintained below 1.0 mg/l with proper methanol dosing. From October through December 2018, effluent total phosphorus concentrations averaged 0.89 mg/l. The ENR system was tested and started up during a period of historically high precipitation in the Baltimore region. Process optimization continues at the time of this writing in January 2019.

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Sophia Liskovich, Gannett Fleming, Inc.

Maryland's Newest Dam Preserves a Community's Most Valuable Resource

Speaker Bio: Sophia is a Project Manager in the Water Department of Gannett Fleming, located in the Baltimore office. She has 17 years of experience with water treatment, storage, and transmission. She is a past Chair of the Chesapeake Section of AWWA and is a recipient of the Carl J. Lauter Award for distinguished service in the water supply field. Sophia is a registered PE in Maryland and Florida.

Abstract: Maryland American Water (MAW), supplies 14,200 customers with water sourced from Winters Run, in Harford County. In the past, during times of drought, MAW supplemented this supply with water provided by the county. However, with water scarcity issues for Harford County they were no longer able to guarantee MAW with the necessary emergency water. In 2014, a temporary purchase arrangement between MAW and the county was approved with the understanding that a long-term backup source, independent of the county's supply, would be secured within four years. With that the Bel Air Impoundment, a cutting-edge reservoir was designed that draws and stores water from nearby Winters Run only when stream flows are sufficient to avoid disrupting the local ecology. It ensures the safe yield of the Bel Air water supply system and provides an emergency water supply for the Bel Air community in case of contamination of the primary source. The impoundment hold 90 MG of raw water and is the largest Maryland dam project constructed in the past 30 years. In times of drought the water can flow to the existing winters run treatment plant by gravity. After careful analysis of different options, the design team selected a bituminous geomembrane (BGM) liner to create a watertight barrier inside the 2,025-foot-long dam embankment and impoundment bottom. Other features in the impoundment are the use of floating wetlands in order to create an ecology that will naturally filter out TSS, Nitrogen, and phosphorous, as well as a mixer and an ultrasonic algae removal system. At the facility's groundbreaking, Town Administrator Jesse Bane highlighted the project's importance to the future of his community, remarking, "History is being made, and I am in awe to be here to witness an act that will save a small town from what could be its eventual demise were it robbed of one of its most valuable resources."

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Jonathan Gordon, HDR Engineering
If You Build It … They Will Complain?

Speaker Bio: Jonathan Gordon is a Water/Wastewater Engineer with HDR. He has a bachelor's degree in chemical engineering from the University of Virginia and hopefully will have a master's degree in environmental engineering from Johns Hopkins University in the next couple of months. Jonathan has worked in the industry for six years and been fascinated by odor and its impact on the public for …even longer.

Abstract: It is a universal truth that utilities responsible for managing collection systems prefer to receive fewer odor complaints. It is also true that the level of effort directed toward minimizing complaints varies significantly by utility. It is not for lack of benefit: reducing odor complaints can improve social trust at the municipal level and, if done through direct treatment, can mitigate collection system corrosion potential. The reason for the uneven application of effort reflects less the difficulty in designing and implementing solutions and more the challenge of sufficiently characterizing odor-producing conditions and the lack of guidance governing which odors require addressing. This presentation covers both. Determining which odors need addressing requires establishing a definition of an odor nuisance that relates the characteristics of the odor to some reasonable likelihood that the odor will be complaint-inducing. Yet any definition is inherently subjective and as a result, there is no uniform definition. Some odor regulations take a simple approach and require odorant concentrations to be maintained below some fixed level at all times. The more advanced standards consider that whether an odor constitutes a nuisance depends on the offensiveness and concentrations of the constituent odorous compound(s), the sensitivity of the subject (receptor) experiencing the odor and the frequency and duration of the receptor exposure to the odor. The frequency, intensity, duration, and offensiveness (FIDO) system developed by the Texas Commission on Environmental Quality (TCEQ) is one such standard. It accounts for those factors with a matrix of odor intensity thresholds over a range of exposure frequencies and durations in which any odor of an intensity greater than the corresponding FIDO threshold is considered a nuisance. Even so, it relies on qualitative (moderate, very strong, etc.) thresholds that are still fundamentally subjective. Odor impact models (such as the one included in WEF MOP 22 for hydrogen sulfide) can be used to inform the conversion of the qualitative intensities to quantitative odorant concentrations; however, the practice of deciding on the conversions is subjective and the conversions themselves are hardly guaranteed to track closely with actual odor complaint occurrence. Characterizing the conditions causing nuisance odor is similar in that it can be done using a number of different approaches of varying accuracy. The most accurate method is field measurement; however, field measurement is expensive and untenable across an entire collection system. The alternative is modeling, specifically modeling the important mechanisms of odor generation, release, and dispersion: the liquid-phase biochemistry, the liquid-gas mass transfer of odorant(s), the collection system airflow, and the decay of odorant concentration(s) between the emission point and the receptor location.

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Arash Massoudieh, The Catholic University of America

A flexible framework for process-based hydraulic and water quality modeling of Best Management Practices

Speaker Bio: I am currently an Associate Professor in Civil and Environmental Engineering at the Catholic University of America. My interests lie primarily in modeling fate and transport of contaminants and microorganisms in aqueous systems including groundwater, surface water, vadose zone, storm-water runoff, and sediment-water interface.

Abstract: Models that allow for evaluation of the effects of design considerations on the performance of best management practices (BMPs) and green infrastructure (GI) to control urban and agricultural runoff and associated contaminants have received considerable attention in recent years. While popular, the GI models are relatively simplistic. However, GI model predictions are being relied upon by many municipalities and State/Local agencies to make decisions about gray vs. green infrastructure improvement planning. Adding complexity to GI modeling frameworks may preclude their use in simpler urban planning situations. Therefore, the goal here was to develop a sophisticated, yet flexible tool that could be used by design engineers and researchers to capture and explore the effect of design factors and properties of the media employed in the performance of GI systems at a relatively small scale. We deemed it essential to have a flexible GI modeling tool that is capable of simulating GI system components and specific biophysical processes affecting contaminants such as reactions, and particle-associated transport accurately while maintaining a high degree of flexibility to account for the myriad of GI alternatives. The mathematical framework for a stand-alone GI performance assessment tool has been developed and will be demonstrated. The process-based model framework developed here can be used to model a diverse range of GI practices such as green roof, retention pond, bioretention, infiltration trench, permeable pavement and other custom-designed combinatory systems. The tool is also equipped with a wizard feature to allow creating models of various types of GIs using pre-designed templates as well as scripting to automate model creation. We will demonstrate the utility of this GI modeling framework to simulate flow and transport in a stream, bioretention, infiltration basin and permeable pavement GI systems.

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201 * Wednesday, August 28th, 2019 * 3:30:00 PM
Eric Harold, Carollo Engineers
Optimizing Scarce Resources: Using Pipeline Renewal Models to Develop Focused CIP

Speaker Bio: Eric Harold is an Associate Vice President with Carollo Engineers in Arlington VA. A graduate of the University of Cincinnati and George Mason University, he has nearly 30 years experience leading or participating system-wide master plan, asset management and modeling studies of wastewater collection systems throughout the U.S.

Abstract: Utilities face significant challenges as they develop and age. Because wastewater collection systems are buried, often underneath a dense urban areas, these systems are "out-of-sight, out-of-mind" to the public—until they fail. The need allocate resources (how much money to spend and on what assets to spend it) for condition assessment and cost-effective rehabilitation/repair of critical infrastructure before they fail continues to be a high priority for utilities across the country, and one of their most vexing challenges. More and more, utilities are turning to pipeline renewal and replacement (R&R) models to understand potential needs, to allocate funding on an annual basis, and to develop prioritized projects for assessment and improvement. While R&R models are not a new concept, the tools available have greatly improved in recent years. This paper will present four case studies illustrating how different utilities used using the same tool and similar data to develop a risk model and R&R projects for their respective CIPs. Important lessons learned in managing the data, developing the risk models and applying the tools to develop CIPs will be presented. The Cape Fear Public Utility Authority (CFPUA), Orange County Sanitation District (OCSD), the Central Contra Costa Sanitation District (CCCSD), and the Yorba Linda Water District (YLWD) have implemented Asset Management Programs. All four agencies initiated collection system R&R models that used different approaches tailored to their utility and collection systems drivers. Where CCCSD wanted to forecast the long-term funding needs to support a rate analysis, OCSD wanted to incorporate condition into the hydraulic-model predicted recommendations in order to better target projects for their upcoming 20 year Capital Improvement Program (CIP). YLWD desired both detailed project list to address early their highest risk assets while at the same time plan for and allocate long-term funding for the maintenance and upkeep of the rest of their system. CFPUA, in Wilmington NC, is a relatively new agency that has assumed older assets from the City of Wilmington. They desired an assessment of their data, work flow process for managing/archiving their data, and a robust risk model to prioritize short/long term spending needs. Using the same software and similar data, these four organizations developed completely separate styles of results to feed their CIPs. By understanding that R&R models can be used differently depending on how the results are packaged, each utility was able to identify a CIP using the same tool and similar data.

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Patrick Dube, Water Environment Federation
Pure Water Brew: Judge water based on its quality not its history

Speaker Bio: Patrick Dube, Ph.D., is a technical program manager for biosolids and odor control in the Water Science and Engineering Center at the Water Environment Federation (Alexandria, Va.). He received his Bachelor's and Doctorate from the University of Florida in Biological Engineering and his research expertise included anaerobic digestion and nutrient removal.

Abstract: Water resources throughout the country are strained by aging infrastructure, population growth, pollution, and climate change. The average person uses approximately 100 gallons of water a day and reusing water can be a vital part of helping preserve our water resources and reduce the strain on our systems. Recycled water will play a critical role in creating and maintaining our sustainable future. The Pure Water Brewing Alliance is a group of utilities, brewers, engineering firms, and technology companies that are helping to build this future by using recycled water to brew beer. Why beer? Beer has long been a staple of communities to help start conversations, foster relationships and drive creativity. Perhaps more importantly, brewers understand the value and importance of water in their own product. Water makes up more than 90 percent of a standard beer and the average water use ration for a brewery is about seven barrels of water to make one barrel of beer. Clean, reliable water is a fundamental building block to continue to make good beer and these shared ideals about sustainability and water have led to the Pure Water Brewing phenomenon. The road to Pure Water Brew started in 2014 when Clean Water Services launched a pilot project with a simple goal: take water from their advanced wastewater treatment facilities and brew beer to help promote water reuse. Taking effluent from their facility, they subjected it to ultrafiltration, reverse osmosis and advanced oxidation to ensure the water was of the highest quality possible and partnered with one of the oldest homebrew clubs in the nation, the Oregon Brew Crew to host a competition for homebrewers to make beer using their water. The competition was a success and is now an annual event with the winner getting to collaborate with a local Oregon brewery and have their beer poured at the largest annual water quality event in the world, WEFTEC. These events and others have helped amplify the conversation around water reuse using recycled water and led to the formation of the Pure Water brewing Alliance. Individually, around the United States, Pure Water Brewing events have played a role in informing the public about water issues. This presentation aims to outline the Pure Water Brewing Alliance as it pertains to telling the story of water reuse and how we can use stories like these to help promote water reuse.

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Chengyan Zhang, Stantec Consulting Services Inc.

The State of the Biogas Washwater Treatment and Upgrading Market

Speaker Bio: Dr. Zhang has broad experience in technology research, economics, and engineering, including wastewater treatment, solids and biosolids handling and treatment. She specializes in multidisciplinary analysis involving financial, economical and engineering.

Abstract: In North America there are currently strong economic drivers influencing the production of renewable natural gas (RNG) from digester gas (biogas). Renewable Identification Number (RIN) credits in the USA is the major financial incentive. There are also other subsidy programs, such as California's and British Columbia's that provide sufficient monetary support to create a advantageous business case for production of RNG than other options. These credits have resulted in significant number of utilities to start investigating upgrading of digester gas from wastewater treatment plants or municipal solid waste facilities to pipeline quality RNG. There are a variety of upgrading technologies to achieve pipeline quality RNG. The four main technologies include: washwater; chemical scrubbing; pressure swing adsorption; and membrane separation. All of these technologies have different merits and limitations, but so far the most prevalent installed at municipal facilities for the production of RNG is washwater treatment. While washwater technology is well proven and established in Europe, the North America municipal market is in its infancy and is strongly influenced by pipeline quality requirements from gas utilities. This presentation will provide an overview of the typical gas parameters which are targeted in biogas upgrading, outline the four major gas upgrading technologies, and examples of vendors who can provide the technology in North America (or possibly in the near future). The presentation will also discuss procurement techniques, which can be used to help implement biogas upgrading technology into a municipal project, including a discussion of key aspects of technical specifications along with the benefits and drawbacks of pre-procurement of a vendor. The presentation will provide real life examples from three North American projects including one in Maryland and two in Alberta.

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nick lewis, gannett fleming

Designed. Bid. Built: Considerations from the Contractor and Consultant on the Clinton Zone Transmission Main Project

Speaker Bio: Nick Lewis is a Design Engineer in the Environmental Facilities Group with Gannett Fleming. For the past 7 years, Nick has worked on various water/wastewater projects in the Baltimore area, and was responsible for pipeline design on the Clinton Zone Transmission Main project.

Abstract: The Clinton Zone Transmission Main is a five-mile long, primarily 42-inch diameter water main intended to increase the north-south transmission capacity of WSSC's 385B pressure zone. Phase three of the transmission main – the central three-mile segment – was designed in 2016 and faced the strategical challenges of difficult terrain, limited work area, easement encroaching utilities, and restricted design flexibility due to high system pressures. All these factors are commonplace in the pipeline business; however, the overall scale of the project magnified the issues and led the design team to anticipate an above average installation cost and construction duration. Despite the perceived challenges, the contractor was able to complete the project ahead of schedule and on a budget significantly lower than the engineer's estimate. The project's success can be tied to the cooperative manner in which the contractor, design engineer, and owner navigated the project's challenges, but also to the contractor's approach to the project. The small adjustments that provided major value during construction are lessons that can be applied to the design phase of many other linear projects. During the presentation, the contractor's project manager and consultant's design engineer for the Clinton Zone project will explore how the transmission main was designed, bid, and built, and how the contractor's approach to the project compared to the design intent. The presenters will talk about which aspects they viewed as the biggest obstacles to construction, as well as provide answers to the following questions that are often asked but aren't frequently shared after a project is completed. What were the opportunities the contractor identified pre-bid to gain a competitive edge? How did the ultimate alignment and construction phasing differ from the design? How were construction challenges overcome to maintain an acceptable design and keep the project on budget? How did value engineering solutions during the construction phase impact the project's efficiency and costs? The presentation aims to provide the audience with real-world insight to pipeline construction in an effort to help facilitate the constructability of future designs, increase the accuracy of estimates, and ultimately lower project costs.

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Andrew Fuller, AECOM

Zinc-Coated DIP Force Main Study: Utility Applies Corrosion Engineering for Thorough Results

Speaker Bio: Andrew is a registered PE in Maryland and DC with AECOM specializing in pipeline engineering, corrosion control, and condition assessment. He received his Bachelors in Civil Engineering from Penn State and a Masters in Environmental Engineering from Johns Hopkins. He holds certifications with PMI, NACE, and NASSCO; and serves as the CSAWWA Asset Management committee chair.

Abstract: In 2009 the City of Virginia Beach (City) started a force main evaluation program to improve the certainty of the condition state of the most critical force mains. Indirect- and direct-assessment techniques were used to evaluate internal and external conditions. The findings showed the City's soil corrosivity characteristics are driving the majority of force main failures through external corrosion of the ferrous pipelines, the majority of which the 190-mile system is comprised of. Thinking long-term and interested in the value of zinc-coated ductile iron pipe (ZCDIP), the City has constructed a run of ZCDIP to measure corrosion activity over time. The design of this pipeline with test stations and the multi-decade field measurements regime is both creative and unique. The City chose a site near corrosive soils, using corrosivity data from their evaluation program, while on accessible City property. The study installed ZCDIP from two manufacturers. The pipe will be dug up after 30 years to gauge their performance. This one-of-a-kind study uses four (4) 20-foot sections alternating a polyethylene-encased and bare ZCDIP. Each section, being from different manufacturers, provides a unique test case. Using corrosion engineering practices their electrochemical state will be monitored throughout the study. Potential (voltage) readings are taken between the soil and portions of the pipe. Assuming consistent soil conditions, these readings are used to determine which portions of the pipe are experiencing the most corrosion. The pipes connecting to this study area to the existing force main were also connected to test stations. These are bare DIP with a single magnesium anode. All of these provide a comprehensive sampling of approaches to control corrosion. This unique test will allow the City to perform at grade testing on large samples, in realistic conditions, for trustworthy results.

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Erik Michelsen, Anne Arundel County Watershed Protection and Restoration Program

Assessing a Full Delivery of Water Quality Improvements Approach Three Years In: Lessons Learned

Speaker Bio: Erik Michelsen is currently the Administrator of Anne Arundel County's Watershed Protection and Restoration Program and is charged with managing its restoration effort to clean up the County's waterways and satisfy its Municipal Separate Storm Sewer System (MS4) and Chesapeake Bay TMDL requirements.

Abstract: Since 2016, Anne Arundel County has gone through three "Full Delivery of Water Quality Improvements" solicitation cycles, awarding contracts for stormwater retrofits, stream restoration, and septic to sewer conversion projects in that timeframe. This presentation will cover lessons learned from those three solicitations as well as some of the issues that can arise in the project implementation phase. Cost effectiveness of the work in the context of MS4 and Chesapeake Bay TMDL compliance will also be discussed, as will the difficulties of awarding these sorts of contracts in the midst of an ever-changing water quality crediting regime.

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201 * Wednesday, August 28th, 2019 * 4:00:00 PM
John Marciszewski, Mueller - Echologics Division
Transmission Main Leak Monitoring to Reduce Risk and NRW

Speaker Bio: John Marciszewski, Mueller - Echologics Division, helps water utilities identify solutions to improve capital efficiency, system resiliency, and water loss management in their distribution systems. With 25 years of commercialization experience, his interests include cloud-based monitoring, condition-driven asset management, and water system valuation. He is an Industrial Advisory Board member for both the Sustainable Water Infrastructure Management Center, and the Financial Research Institute. John has an M. Eng from the UC-Berkeley and a BME from Kettering University.

Abstract: The Singapore Public Utilities Board (PUB) manages 6,000 kilometers of water pipelines, of which 1,500 kilometers are transmission mains. As water mains increase in diameter, they also increase in criticality and complexity. Each transmission main is a site-specific installation designed to ensure safe operation given local loading and degradation considerations. Singapore's transmission main network has a significant portion of steel and cast iron mains. A common degradation and failure mechanism for these ferrous transmission mains is corrosion through-holes, which can progress over time into more significant failures. PUB has a holistic approach to water management that includes the core strategy of saving every drop of water. Understanding when a transmission main starts to leak supports that goal. Towards these ends, PUB has begun use of leakage monitoring systems. To realize the greatest value from the leak monitoring system deployment PUB completed a criticality evaluation to identify 100 kilometres of transmission mains with the highest consequence and likelihood of failure. Factors considered in the criticality model included age, proximity to critical infrastructure, and leak history. A key test of new technology is can it be implemented at scale? The paper reviews the cost and effort associated with system installation, system limitations, and practical challenges for the transmission main leak monitoring system deployed. Leakage management has financial consequences related to water loss, damage to nearby infrastructure, and impact to business and the community. The paper quantifies the financial savings associated with leak monitoring from water loss as well as operational and repair impacts. Tracking leak indications in both time and space allows water asset owners to target and plan the efforts of their transmission main repair crews appropriately. Case studies provide details of leak monitoring system operation including the operational & financial impacts of leaks identified by the system.

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202 * Wednesday, August 28th, 2019 * 4:00:00 PM
Keith Tyson, WSSC
Innovation for a Sustainable Utility of the Future

Speaker Bio: Keith Tyson, P.E., Engineering and Environmental Services Division Manager for Washington Suburban Sanitary Commission (WSSC), has over 30 years of experience in design, construction and facility management. Mr. Tyson is leading the innovation team at WSSC, focused on finding new technologies and processes for the water and sewer networks and plants to reduce operating expenses and generate new revenue.

Abstract: Serving 1.8 million people, Washington Suburban Sanitary Commission (WSSC) is one of the largest water and water resource recovery utilities in the United States. As a part of its commitment to excellence, WSSC developed a utility-wide Innovation and Research Program to generate ideas and initiatives that will positively affect the utility's facilities and pipe networks. The program has three specific objectives: (1) reduce operational expenditures; (2) improve sustainability (i.e., resiliency, efficiency and quality); and (3) generate revenue to offset rate increases. A key challenge in starting an Innovation and Research Program is creating and fostering a culture of innovation throughout the organization. Using The Water Research Foundation (WRF) Utility Innovation Framework (Framework) created in WRF Project 4642, WSSC is conducting an evaluation of its current innovation environment using: Conducting an all-staff self-assessment survey, Hosting interviews and workshops to establish target program maturity levels using the eight (8) business disciplines from the Framework, Identifying required program resources and create key performance indicators, and Collaborating with WSSC's communications department to develop an internal engagement and collaboration strategy to accelerate culture change. This presentation will provide WSSC's methods of driving culture change and lessons learned in leading this effort. Session participants will learn how to evaluate the cultural backdrop for innovation, select target innovation program maturity levels, measure impact across financial and non-financial dimensions and establish key performance indicators that align with its Strategic Plan and can demonstrate the value of an Innovation Program to its customers and rate payers.

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203 * Wednesday, August 28th, 2019 * 4:00:00 PM

Paula Sanjines, Jacobs Engineering

Increasing Treatment Capacity and Process Efficiency in a State-of-the-Art Water Resources Recovery Facility

Speaker Bio: Paula Sanjines is a senior technologist for Jacobs Engineering at their Silver Spring, MD office. Ms Sanjines has over 20 years of experience in the planning, design, construction and operation of wastewater treatment systems. She has a BS in Chemical Engineering and an MS in Environmental Engineering from Stanford University and is a registered professional engineer in MD and VA.

Abstract: Utilities are striving to reduce chemical and energy use in the operation of their Water Resources Recovery Facilities (WRRFs). This is especially true for those with stringent effluent requirements for total nitrogen (TN), which often results in greater use of supplemental carbon to drive denitrification. The AlexRenew WRRF (54 MGD AADF) has recently been upgraded to meet an annual average TN concentration of 3 mgN/L. This facility, while designed with an efficient step feed BNR configuration, has relied on the addition of up to 1,000 gallons per day of methanol to achieve these stringent effluent requirements. Recent upgrades have been targeted to significantly mitigate the higher reliance on methanol and higher energy demands, and have included: 1) Centrate treatment using deammonification to remove the highly concentrated ammonia load from dewatering anaerobically digested biosolids. 2) Implementation of a customized ammonia-based aeration control (ABAC) strategy to assist in out-selection of nitrite oxidizing bacteria (NOBs) and reduce aeration energy. 3) Mainstream WAS hydrocyclones to retain anammox granules seeded from the sidestream reactor to provide improvements in N-removal and mixed liquor settleability. 4) Primary effluent flow/load equalization to diminish fluctuations in C:N ratio of the bioreactor feed, aeration demand, and methanol dosage requirements. A key component to the upgrades was to attempt to “activate” the anammox granules for mainstream nitrogen removal, which is known to be a challenge at the lower temperatures and substrate concentrations compared to the sidestream process. Customized strategies were developed using BioWin for aeration and supplemental carbon dosing. The control algorithms include ammonia-based aeration control (ABAC), intermittent aeration, automated methanol dosing and automated ORP control to prevent anaerobic conditions in the post-anoxic zone. Since the systems were placed in service in 2016, the facility has reduced aeration requirements by 30% and methanol consumption by 50% compared to previous years, all the while meeting the more stringent final effluent total nitrogen limits. The final effluent TN concentration has been reduced from 3.8 mg/L (average in 2014 and 2015) to 2.7 mg/L (average in 2016, 2017 and 2018). The facility has saved almost $300,000 per year in chemical expenditures. Ongoing work will introduce anammox granules from the sidestream into the mainstream and further tuning of the system will be carried out to further improve NOB suppression. The full paper will describe the various components of the system, including the control algorithms and present the results to-date.

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Allyson Merola, Whitman, Requardt & Associates, LLP

Ocean City Subaqueous Water Mains - Eliminating Dead Ends

Speaker Bio: Allyson Merola is a Senior Project Engineer with Whitman, Requardt & Associates in Baltimore, MD. She holds a bachelor's degree in environmental engineering from the University of Delaware. Allyson is a registered Professional Engineer in the State of Maryland and has eleven years of engineering experience including water and wastewater treatment, distribution and collection systems, and hydraulic system modeling.

Abstract: The Town of Ocean City's (the Town) water distribution system has several unique physical and operational characteristics. These unique characteristics include a relatively long (10 miles) and narrow (0.2 to 1.0 miles) configuration, six (6) finished water storage facilities spaced along its length sized for max day summer conditions, three (3) separate water treatment facilities which operate at different frequencies and periods, and dramatic seasonal water demand fluctuations which are due to differences in the population served. Current census numbers indicate a full-time resident population of approximately 7,000 and over 300,000 visitors during a peak summer weekend. This dramatic fluctuation in seasonal population leads to an increase in water demand of over 10 million gallons per day (MGD). The water distribution system is comprised of approximately 96 miles of piping ranging in size from 4-inch to 24-inch. Most of the piping (approximately 71%) is 8-inches or smaller in diameter. The oldest piping in the distribution system dates back to before 1955 and the majority of piping in the system is either cast iron or ductile iron pipe. The system generally consists of multiple north to south finished water transmission mains in Coastal Highway/Philadelphia Avenue ranging in size from 16-inch to 24-inch in diameter along with numerous smaller distribution lines (4-inch to 12-inch) which branch to the side and cross streets. Due to the narrow nature of the island, many of these distribution mains dead end at the water and experience little to no water demands during the winter off season. Hydraulic modeling has indicated high water retention times at these dead ends which can lead to water quality issues. As a result, the Town is engaged in an on-going program to loop these dead end lines which can only occur by crossing various water channels. To do so, the mains are designed as trenchless pipe installations achieved by the directional drilling of high density polyethylene pipe (HDPE). The result of these projects is the promotion of water movement and a more reliable water service, including for fire protection. The mains have ranged from 6-inches in diameter to 10-inches in diameter and from 200 linear feet (LF) to 600 LF in length. Challenges in the design of these subaqueous water mains include location of mains in relation to private homes and development, relationship to existing utilities, clearance of seawalls and bulk heads, and potential impacts to environmentally sensitive waters.

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Robert Bell, OBG, a part of Ramboll

Sewer Sleuthing of the Oxon Run Interceptor to Remediate a Significant Overflow

Speaker Bio: Robert E. Bell Jr., P.E. is the Networks Global Division Market Unit Leader for OBG, a part of Ramboll. Bob has 34 years of experience in the assessment and rehabilitation of underground infrastructure. He is a Graduate of the University of Central Florida and a licensed Professional Engineer. Mr. Bell has led the assessment of over 15 Million feet of underground infrastructure systems as well as the design and rehabilitation of over 1 Million feet of piping, often utilizing trenchless technologies.

Abstract: The Oxon Run interceptor is a critical portion of DC Waters' sanitary sewer collection system. It was constructed between 1941 and 1975, and includes approximately 42,832 LF of 24-inch to 66-inch diameter pipe, and approximately 127 manholes/structures. This interceptor receives flow from the Washington Suburban Sanitary Commission (WSSC) and conveys it to the Blue Plains Advanced Wastewater Treatment Plant (Blue Plains). The Lower Oxon Run Interceptor (LOX) experienced surcharging and subsequent Overflows on site at Blue Plains on August 7, 2017. DC Water engaged the Sewer Program Management Team (SPM) to troubleshoot the cause of the overflow and to identify measures to correct the condition. The team worked collaboratively with DC Water to formulate a work plan to identify the cause of the overflow. This involved the review of system mapping, flow data, and recent operation and maintenance activities; performance of a trunk walk at exposed creek crossings; a review of the hydraulic grade lines for various flow scenarios, and a wet weather field response. The team quickly identified the cause of the overflow to be an obstruction within a meter vault on the Blue Plains site. Due to the system geometry and hydraulic characteristics, the obstruction removal was no simple task. The team then formulated a corrective action plan which consisted of plugging the submerged upstream piping, de-watering the suspected obstruction location, and heavy cleaning to remove the obstruction. Plugging of the submerged piping involved the use of divers to install plugs into the upstream 48-inch sewer that was surcharged approximately 10 feet. Upon removal of the obstruction, it was determined that the reduction in diameter at the meter location was a significant factor in the cause of the overflow. Because this meter had not been in use for years, the team made a determination that the removal of the meter, and replacement with a spool piece would assist in the mitigation of potential future obstructions. The DC Water/SPM team prepared the plans for the removal/replacement of the meter and then engaged the on-site High Priority Contractor to facilitate the work. Upon completion of the work the plugs were removed and the system was returned to normal operational service. This presentation will present the project background and process used to troubleshoot the cause of the overflow, the subsequent removal of the obstruction and ultimate mitigation of potential future obstructions. Attendees will benefit from this presentation by learning the strategies employed to efficiently identify the source of an overflow, and remediate the problem.

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206 * Wednesday, August 28th, 2019 * 4:00:00 PM
James O'Shaughnessy, Arcadis
Rising Waters: Protecting Fairfax County's Huntington Neighborhood

Speaker Bio: James is a Senior Water Engineer at Arcadis with experience in design and construction of water and wastewater treatment facilities and pump stations. He holds bachelors and masters degrees in Civil Engineering from Virginia Tech. He is a registered professional engineer in the Commonwealth of Virginia.

Abstract: Communities located along urban waterways are increasingly at risk for flooding due to increased runoff from impervious surfaces and intensification of rainfall events. One such community in the Huntington neighborhood of Fairfax County, VA experienced significant flooding from Cameron Run in 2006, 2008, and 2011. Flooding within the community adversely impacted residents and the response to the events required significant resources from the County. To address this problem, Fairfax County completed the Huntington Levee Project to protect the community from the 100-year flood event on Cameron Run. This presentation will discuss improvements to provide flood protection to the community and the challenges with their construction. The improvements include 2,800 linear feet of levee, stormwater conveyance systems, and two stormwater pumping station sized at 26 MGD and 155 MGD, respectively. The stormwater pumping stations include mechanical bar screens, submersible end suction pumps and submersible axial flow pumps. The size of the larger pumping station was optimized using physical modeling to reduce capital cost of the facility. The physical modeling effort resulted in a 35-percent reduction of the facility's wet well footprint. Construction of the project required significant work within the existing floodplain. The project was staged to minimize potential flood impacts during construction. During significant rainfall events, temporary pumping systems and temporary embankments were employed to provide flood protection to the community. The two-year construction project was completed successfully without flooding impacting the community. Since being placed into operation in late 2018, the facility has successfully protected the community from flooding from Cameron Run and evacuated the levee's internal drainage area. In addition to providing flood protection, the facility includes trails through the project site and on the levee that are used by the community for recreation.

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201 * Wednesday, August 28th, 2019 * 4:30:00 PM

Ethan Vidal, Xylem

Listen. Monitor. Locate. Repair. – Preventing Distribution Main Breaks With Remote Monitoring Networks

Speaker Bio: Ethan Vidal has 8 years of experience in the pipeline condition assessment and smart water industry. He has worked on dozens of pipeline inspection projects in the water, wastewater, power and industrial spaces. He holds a B.A. degree from Amherst College and is pursuing a second bachelor's degree in Civil Engineering. He is currently the Business Development Manager for Pure Technologies/Xylem in the Mid-Atlantic region.

Abstract: Water utilities continue to increase focus on minimizing non-revenue water and finding improved methods to lower and manage water main breaks. Limited staff resources and lack of actionable information often force utility managers to react to failures rather than proactively addressing them. To reduce the burden of main breaks in their distribution system, the Howard County Maryland Department of Public Works (County) initiated a pilot program which deployed remote sensing and monitoring technology in Savage, Maryland. In September 2018, several hydrant mounted sensors were installed to provide high resolution pressure and acoustic information within the distribution system. The data stream was continuously monitored by advanced algorithms and trained analysts 24 hours a day, using the County's own GIS with hydrant, water main and connection geospatial locations. The data, including location of leak/burst and transient events, was displayed in real time and on the County's mapping layer via an online dashboard. The pilot had an immediate benefit, identifying a series of anomalies in the monitored area within weeks. In October 2018, a leak was detected by the monitoring system. While the County was investigating and monitoring the area, the main broke. The detection of this event and subsequent main break highlighted the need for improved response time, but ultimately showed that anomalies could be detected in advance of a break with sufficient time to proactively repair the main and thus avoid a main break. The County established additional management procedures to ensure a more rapid response. In November 2018, another acoustic anomaly was identified, and the response time was shortened to a week. This acoustic event was localized with correlators and a leak was confirmed and proactively repaired without a main break. This pilot showed that integrating data from remotely deployed, high resolution sensors with real-time analysis and boots on the ground action can identify acoustic anomalies with sufficient time to implement proactive repairs to reduce the impacts of water main breaks. This paper summarizes the types of sensors and data attained during the project and recommended management options based on this type of monitoring system.

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Devang Prajapati, Mott MacDonald

Hey, wait a minute – before you go can we write that down... Creating a SOP program

Speaker Bio: Devang Prajapati is a registered Professional Engineer in District of Columbia with 15 years of experience in the field of water and wastewater engineering. He has worked on wide variety of program management, planning, feasibility, design and construction projects in various countries including India, Abu-Dhabi, Bahrain, UK and the US. He holds a Bachelors and Masters degree in Civil and Environmental Engineering from Sardar Patel University, India.

Abstract: Standard Operating Procedures (SOPs) are the basis for an effective and efficient operations of any system. DC Water's Water Distribution and Sewer Operations have outdated and often non-existing documentation of operating information in the form of standard operating procedures (SOPs). Furthermore, a large amount of operating information resides, not in written format, but with the operators themselves who have operated, adapted and optimized the systems through trial and error. As the ageing workforce continues to retire capturing this 'learned' system knowledge requires a comprehensive approach to the development and upkeep of the SOP documents. DC Water Operations reached out to the Planning Department to asses this need and create a long-term plan for these efforts. To do this, the Planning Department created a SOP writing program which started at a very basic level by clearly defining what is meant by and included in an SOPs, Job Plans (JPs), Service Manuals and O&M Manual. A gap analysis was conducted to identify the SOPs and JPs that needed to be created in categories of Water Pumping Stations, Water Storage Facilities, Water Linear, Sewer and Storm Pumping Stations, Sewer Linear and Administrative SOPs. A pilot project was completed to identify the level of detail and effort required for typical SOP. Based on gap analysis and pilot project information, a multiyear roadmap to write SOPs was implemented. The 2018 SOP program was designed to have two tracks of activities as follows: Track 1 – This track dealt with the programmatic elements and activities. This track facilitated the prioritization of SOPs to be completed in the year 2018, and also updated the previous gap analysis. A large part effort was focused on setting up standard formats, content structure, visual elements of format that provide consistency homogeneity and ease of use for the operators. A SOP numbering scheme was devised which is self intuitive and aligns closely with the DC Water's work order management system (Maximo). A file management and online access system was put into place on DC Water's SharePoint system for remote access of SOPs. All this information was captured in the SOP Writing Guidance Manual with an intent of making the future writing of SOPs for the upgraded and new assets to be independent of the Planning Department. Track 2 - This track included the actual writing of the SOPs. Under Track 2 approximately 30 prioritized SOPs were written during the year which are currently in process of training and implementation. The priority of these SOPs was based upon stakeholder needs providing the catalyst for input from these parties. This paper discusses the challenges in setting up the program which included collaborating with a wide range of stakeholders from different departments, and at different level of management with competing priorities, capturing field knowledge, and getting technical reviews from an increasingly busy field staff.

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Tanja Rauch-Williams, Carollo Engineers
Status and Developments of Co-digestion in the US

Speaker Bio: Dr. Tanja Rauch-Williams serves as Carollo's Wastewater Innovation Lead and Principal Technologist with more than 20 years of experience in wastewater treatment, water reuse and applied research. Her work has focuses on wastewater treatment optimization for biological nutrient removal and resource recovery, energy optimization, and trace organic removal. Tanja is co-chair of the Rocky Mountain Innovative Water Technologies Committee, and local affiliate of the Leaders Innovation Forum for Technologies (LIFT).

Abstract: Organic food waste is an underutilized energy and nutrient resource in North America that is largely still disposed of in landfills contributing notably to today's anthropogenic global warming. First states in the U.S. and provinces in Canada have taken regulatory action to help divert food waste resources to more sustainable practices with others expected to follow. Over the past decade, entrepreneurial initiatives by private and public entities to separate, collect, pre-treat, distribute, and recover source separated organics (SSO) at water resource recovery facilities (WRRFs) have gained a first foothold in different geographical regions in North America. Due to the ubiquitous availability of food waste, participation in these programs generates interest among all sizes of WRRFs. At this time, the estimated number of WRRFs that co-digest some type of food related waste in the US varies from about 80 to 200 WRRFs, about a quarter of which are located in California (EPA 2018). The majority of these facilities have FOG programs. Only a handful of WRRFs are currently accepting SSO food feedstock in the US and Canada for full-scale digestion. A much larger number of WRRFs throughout the US has conducted pilot digestion tests with these substrates and are getting ready to implement such programs in the near future. The presentation will summarize industry experience gained from the planning and design of co-digestion systems in the southwest of the U.S. We will complete this information with results gained from various recent and ongoing Water Research Foundation (WRF) co-digestion projects that summarized practical national and international co-digestion experience (Appleton & Rauch-Williams, 2017; Rauch-Williams & Schaum, 2018). When implementing SSO co-digestion programs, WRRFs are facing uncertainties at this time related to the substrate quality and treatment impacts, co-substrate supply reliability, digester loading limitations and impacts on the overall treatment process. Related ongoing research efforts that the authors are involved in will be summarized.

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204 * Wednesday, August 28th, 2019 * 4:30:00 PM

Chelsea Pearce, OBG part of Ramboll

Instant Water Main: Expedited Approach for the Design of Three Miles of Distribution Water Mains in Howard County

Speaker Bio: (...)

Abstract: Almost every water system owner across the country is faced with the challenge of replacing water transmission and distribution infrastructure that has reached the limits of its service life. Owners of older water systems with "active" infrastructure that's excessively "aged" (50-100+ years old), are suddenly challenged to implement annual replacement programs to replace mains that have exceeded their useful service life and are starting to fail. A primary factor that drives the selection of main replacement in a water system is an increase in the frequency of breaks that occur in a localized portion of the system. Every time a "break" occurs, the utility Owner is challenged with providing an immediate response to restore system service to impacted customers at a premium cost. Responding over and over to "breaks" in the same area of the system is certainly not desirable from a cost standpoint, a workforce commitment standpoint, or a public relations standpoint. In turn, designing improvements to these sections of the system becomes critical to alleviate accruing costs and customer dissatisfaction that both grow with each "break" that requires a response. And, keep in mind, each repair is only a band-aid placed on a system that needs to be replaced. When faced with these types of situations, it becomes critical to execute the design, bidding, and construction of main replacement as quickly as possible. Howard County was recently faced with a situation where a localized area within the distribution system saw an uptick in breaks/failures. Executing a "conventional" project design (i.e. complete data acquisition activities (survey, utility locating, geotechnical investigations), data verification activities, detailed design efforts with multiple milestone submissions (70%, 90%, 100%, Final, Bid-Ready), and multiple rounds of intermittent design package reviews) was not desirable due to the typical time it takes to complete (a year or more.) Instead, the County decided to take an "unconventional" expedited approach to design and construct the replacement of the mains for this project. This paper will present the County's approach to expediting the design, permitting, and bidding of three miles of PVC distribution main replacement in the County. Two key factors of this approach that will be the focus of the paper are: 1.) How the County/Engineer worked closely together as "partners" to maximize the value of utilizing existing system documentation supplemented with self-performed field investigations to develop comprehensive, detailed design documents to solicit competitive contractor pricing. 2.) How the County/Engineer developed a phased, detailed construction execution strategy that will rely on an Owner/Engineer/Contractor relationship during construction to "build" the project together. Construction is expected to be initiated in the spring of 2019.

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205 * Wednesday, August 28th, 2019 * 4:30:00 PM

John Gresh, RJN Group, Inc.

Trunk Walk Manhole Inspections: Obstacles and Challenges Require Unique Solutions

Speaker Bio: John S. Gresh, P.E., Project Manager, RJN Group, Inc., Vienna, VA. BS in Civil Engineering, University of Virginia, 1980. Mr. Gresh has been employed at RJN since 1987. . His experience includes study and design of wastewater collection system components. He has participated in numerous large scale data collection projects for wastewater collection systems in the mid-Atlantic region. These projects were GIS-centric and involved enhanced, GPS-enabled, electronic data collection.

Abstract: WSSC has performed three rounds of comprehensive field survey and inspection of over 19, 000 trunk sewers and manholes in their sanitary sewer basins since 2008. This inspection program represents over 900 miles of sewer and is a part of a comprehensive response to a Consent Decree with the USEPA and the Maryland Department of the Environment. This presentation will focus on some of the challenges encountered, lessons learned and related benefits that have accrued to WSSC. Because WSSC has a very large and mature trunk sewer network, a variety of logistical challenges had to be overcome. These included variable topography, older components in very difficult access area, coordination with other entities, and the need to incorporate trunk walk procedures into a more traditional manhole inspection process. The trunk walk is a unique aspect of the Consent Decree, included to enable the assessment of pipeline integrity for trunk sewers above 15-inch diameter, particularly along the areas adjacent to and near stream crossing. WSSC is using the data generated by this project to develop rehabilitation rankings. Ongoing challenges to the inspections include, removal of foreign objects that pose a blockage risk, deep structures with intermediate platforms that limit remote inspections, flooded and normally swampy areas, and buried and seized covers. Methods employed to overcome these obstacles will be discussed including boats and options for drone use. Variable conditions can produce findings that change over time. For example, pipe exposures are not always visible because flow levels are variable and stream bank erosion is so dynamic. These aspects will be discussed.

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206 * Wednesday, August 28th, 2019 * 4:30:00 PM
Meghan Gloyd, Biohabitats, Inc
Incorporating Stream Restoration Techniques in Stormwater Management

Speaker Bio: Ms. Gloyd is a water resources engineer with over ten years of experience in stormwater management, stream restoration design, hydrologic & hydraulic modeling, and development of construction plans. She has worked on projects at both the site and watershed scales with private homeowners and municipalities. Her experience also includes construction oversight and inspection.

Abstract: This project utilized stream restoration techniques to retrofit an existing stormwater management pond in Gaithersburg, Maryland as a part of the Montgomery County's Department of Environmental Protection's (MCDEP) efforts to comply with its Municipal Separate Storm Sewer System (MS4) permit requirements. The existing dry pond, located in the Great Seneca Creek watershed on Maryland-National Capital Park and Planning Commission (M-NCPPC) property, was retrofitted to provide innovative water quality management for the 48.5-acre drainage area. The existing pond outlet works were removed and replaced with a cascade structure, which regulates flow to the sand filter constructed within the pond footprint. A new sand filter basin was constructed in open space immediately downstream of the existing basin and features a sand berm with a gabion stone core. A riffle controls the flow into the new basin. Both basins are designed to pond a foot and a half of water until infiltration occurs, improving water quality through filtration and promoting infiltration. The downstream reach was restored using a riffle pool sequence. Due to the innovative nature of the design, the permitting process involved navigating a host of challenges. Construction was completed in the fall of 2018. The presentation will include observations from the design phase, construction phase, and project performance during the first year of installation.

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201 * Thursday, August 29th, 2019 * 8:30:00 AM

Kate Zhao, Pure Technologies, Inc

Detecting High Risk Zones Using a Spatial Clustering of Pipe Breaks

Speaker Bio: Kate Zhao is a project manager at Pure Technologies with focuses on innovative solutions for utility management including pipeline system prioritization, network modeling, and support strategic decision makings. Kate has a strong interest in bringing data driven solutions to traditional pipeline management. She is a registered Professional Engineer in Maryland.

Abstract: With limited budgets and an aging system, infrastructure managers have increasingly sought cost-effective means to evaluate asset condition. While physical inspections can provide high quality data, they can be cost prohibitive at times. Pipe replacement is also expensive and replacing pipe that is still in good condition is not fiscally efficient. As such, an alternative method is to use available information to perform a desktop analysis, estimating the current conditions by exploring past performance records to help prioritize inspection and replacement. The spatial clustering of pipe breaks is an approach to observe the location of failures and identify regions with abnormally high failure rates. A clustering analysis fits well into a wider asset management framework, where the identified clusters act as possible evidence of distress which then might be targeted for physical inspection or replacement. We present an algorithm for scanning and clustering break data on pipe networks and demonstrate its application. Empirical findings show that the identified clusters can provide a high capture rate of future failures, proving itself a useful approach for decision support.

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202 * Thursday, August 29th, 2019 * 8:30:00 AM

Elik Livay, Gannett Fleming, Inc.

EPC Advantages and Why Should Utility Owners Consider it

Speaker Bio: Elik Livay is a Vice President with Gannett Fleming responsible for providing complete design and construction management services for water/wastewater infrastructures. Mr. Livay has more than 20 years of experience in the industry, and he has designed and managed several multimillion dollar water/wastewater infrastructure projects. Mr. Livay has a bachelor's degree in civil engineering from Morgan State University, and a master's degree in civil engineering from Norwich University. Mr. Livay is a registered Professional Engineer in nine states, and a certified PMP and ENV-SP.

Abstract: Water infrastructure owners have several delivery methods from which to choose for their capital improvement projects. In particular, the turnkey engineering, procurement, and construction (EPC) delivery model is gaining traction across manufacturing industry, especially among owners with industrial wastewater assets. The term EPC delivery often is used interchangeably, albeit incorrectly, with design-build. While the two share similarities, including single-source responsibility for design and construction, fixed-price contracts, and the risks of cost, schedule, and performance, EPC offers an extension of services which render it highly applicable to distinct project types, such as industrial wastewater, and distinguish it from other delivery methods. Under the EPC model, in addition to designing and building the facility, the contractor also is responsible for guaranteeing the performance of the completed facility, in terms of quantity and quality of the product. This makes EPC a strong contender for process-driven projects. The EPC model relies on the contractor for the procurement of all equipment, materials of construction, and subcontractor services to facilitate turnkey delivery. From groundbreaking to commissioning, the EPC firm is solely responsible for the project. EPC projects can be delivered in any cost format: lump-sum, guaranteed maximum price, or time and materials—whichever best mitigates risk. EPC also invites the highest level of integration among project team members. Since EPC integrates design and construction, field activities can commence much earlier than with other delivery methods, offering owners cost savings and accelerated project schedules—similar to design-build, but with enhanced quality guarantees. EPC is particularly applicable to manufacturing facilities—those whose purpose is to produce a specific product or products from raw materials. We are applying this delivery method for Denmark-based pharmaceutical giant Novo Nordisk, for a $40 million industrial wastewater pretreatment plant that will support a new $1.8 billion Diabetes Active Pharmaceutical Ingredient (DAPI) manufacturing facility in Clayton, North Carolina. Sized to process 0.70 million gallons per day, the industrial wastewater pretreatment plant includes pH neutralization equipment, two equalization tanks, two bioreactors with four-stage Bardenpho process, two secondary clarifiers, two aerobic digesters, two dissolved air floatation (DAF) systems, Parshall flume, sludge conditioning, and centrifuge. The three support facilities include administration/laboratory, a blower/motor control center, and a DAF/dewatering building. The 21.7-acre site has approximately 170,000 square feet of both buildings and structures. The treatment plant is expected to be commissioned by August 2019, two months earlier than the anticipated schedule. Owners of industrial wastewater assets have unique interests that can drive their preferred delivery method. Novo Nordisk cited three key differentiators for their selection of EPC. First, as the EPC firm, Gannett Fleming offered the complete in-house services for process design and construction management, including specifying, procuring, and installing all process and related support equipment. Second, Gannett Fleming is certifying the performance of the completed facility, including quantity (flow) and quality (effluent discharge requirements). Third, the EPC approach provides greater time and cost savings by integrating the design and construction activities into the process.

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203 * Thursday, August 29th, 2019 * 8:30:00 AM

Bryce Figdore, HDR

Aerobic Granular Sludge Bioaugmentation in Low-SRT Flocculent Activated Sludge: Bench-Scale Demonstration and Pilot Testing

Speaker Bio: Bryce Figdore is a wastewater process engineer with HDR based in Bellevue, WA. He has a Bachelor's degree from The Pennsylvania State University, a Master's degree from Villanova University, and a PhD from the University of Washington where his work focused on granular activated sludge. Bryce is enthusiastic about applying his expertise in biological nutrient removal to deliver innovative and robust solutions to protect water quality and astutely manage water resources. Occasionally he can be found exploring the great Pacific Northwest while fly fishing or hiking with his family.

Abstract: This research investigates bioaugmentation with aerobic granules from sidestream centrate treatment to enable nitrogen removal in non-nitrifying mainstream activated sludge treatment, where granules have a longer SRT by selective retention. Process viability was demonstrated at bench-scale with two types of granules: 1) aerobic granules performing nitrification only (NIT granules) and 2) aerobic granules performing nitrification, denitrification and enhanced biological phosphorus removal (NDN-PAO granules). Sidestream nitrogen loading rates were 0.58 and 0.54 kg TN/m3-d for the NIT and NDN-PAO reactors, respectively. Average ammonia removal efficiency in the NIT reactor was 80% and average TN removal efficiency in the NDN-PAO reactor was 88%. In separate bioaugmentation tests using the different granule types, addition and selective retention of granules sustained nitrification and allowed nitrogen removal by denitrification in non-nitrifying flocculent activated sludge. Bench-scale mainstream effluent NH3-N concentrations near 1 mg/L were achieved at 12°C and 2.5 day aerobic SRT. Granule removal at the end bioaugmentation immediately resulted in near-complete loss of nitrification. Nitrification capacity associated with waste sidestream granular sludge was 2.4 times higher for the NDN-PAO system; therefore pilot design at a municipal WRRF was based on bioaugmentation with NDN-PAO granules. The pilot sidestream reactor achieved similar TN loading and removal rates as the bench-scale system within 90 days of startup, which was facilitated by seeding with small granules harvested from a full-scale continuous-flow anaerobic-aerobic conventional activated sludge process. Mainstream granule-floc separation and bioaugmentation performance in the pilot system are being evaluated in ongoing work.

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204 * Thursday, August 29th, 2019 * 8:30:00 AM

Michael Mulcare, Mott MacDonald

Shedding Light on Getting Power to Remote Sensor... the Solar Option

Speaker Bio: Mike is Mott MacDonald's Smart Infrastructure Leader based in Arlington, VA. His work focuses on integration of sensory technology, communications infrastructure, data analytics tools, and enterprise systems to enable effective system management. He has extensive experience deploying asset management systems; managing multifaceted engineering and IT projects; and integrating information technology into new business processes. Mike has a Bachelor of Electrical Engineering from Georgia Tech, a Master of Arts in Finance from Harvard University, and an MBA from MIT.

Abstract: Smart infrastructure is the merging of physical and digital infrastructure to provide more data into how systems operate to enable greater sensemaking and better decision making. The essential ingredient that links the physical to the digital is sensors. These sensors can tell us system pressures, operating temperatures, customer demand, sewer flow rates and levels, rain fall, pipe stresses and strains, water chemistry, and a myriad of other pieces of information that help us develop a picture of how the systems are working. Coupled with advanced analytics, modeling, and visualization these pieces of information enable more efficient and effective management of critical infrastructure. Unfortunately, the digital world comes to a stop as soon as electrons stop flowing. Sensors need power, and for remote sensors so do the associated radios. This is a significant problem as more sensors are dispersed in the distribution and collection systems. While service connections from the local electrical utility are an option, in most cases the solution is batteries. Multiple factors impact battery life, but the most important to the current demand from connected detectors, microprocessors, and radio communications hardware. While significant gains have been made to lower power consumptions, the specific type detector(s) used, what processing is done on the raw signal from the detector, and the type wireless protocol used (e.g. LTE Cat-4, LTE Cat-1, 3G, LoRa, etc.) set limits on how low of power consumption can be achieved. Furthermore, how much data must be transmitted and over what distance further define expected power usage. Whereas pipes, valves, and other physical components in a distribution or collection system have service lives measured in years and decades, battery life in remote sensors may be measured in days, weeks, or months. Some sensors are designed to economize on power consumption to provide battery life of several years but do so by limiting the quantity of data sent and only transmitting data a few times per day. As technology moves towards real-time management, this long latency is unacceptable. The solution to this power problem is solar. Increasingly, solar power is being used to power smart city infrastructure including street lights, parking meters, bike share stations, traffic camera, compacting trash bins, and many other technologies. Lowering solar system costs and improved hardware performance have enabled this technology to be the "go-to" solution for off-grid remote devices. This presentation will talk through the solar option. Discussion will include how the technology works and in what applications it is well suited. Important design considerations including solar panel and battery sizing; site selection and permitting; and panel mounting and orientation will be covered. Economics of this technology will address installation and life-cycle costs. Discussion will conclude with examples of solar installations, potential pitfalls and ancillary benefits, and current trends with this technology. As an enabling technology for smart infrastructure, understanding solar technology is essential for utilities looking to deploy remote sensors beyond pump stations and reservoirs.

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205 * Thursday, August 29th, 2019 * 8:30:00 AM

Anthony Elberti, Gannett Fleming

PS-6 Design and Construction: How to build a 28 mgd self-cleaning wet well pumping station in 14 months

Speaker Bio: Mr. Elberti is a Senior Project Engineer and Project Manager with 20 years of experience. He has been with Gannett Fleming, Inc. for the past 11 years where he serves as the Wastewater Process Technical Working Group Leader. In addition to wastewater process, Mr. Elberti also has delivered design through construction phase services for WWTP's, industrial applications and collection and conveyance systems. He holds a BS in Civil Engineering from Penn State University, and an MS in Water Resource Management from Villanova University.

Abstract: DELCORA owns and operates the Western Regional Treatment Plant (WRTP) in Chester, PA. The WRTP has a capacity of 65 MGD of annual average daily flow and receives flow a number of pumping stations. There are some portions of the collection system that discharge to the WRTP by gravity. Flow received at the WRTP by gravity as well as hauled in waste had been handled by the EPS-1 pumping station. In order to increase capacity and address hauled in waste receiving and plant recycle flow needs, the PS-6 pumping station was designed to replace the EPS-1 pumping station. The PS-6 pumping station is a combination of a 28 MGD raw wastewater and a 5 MGD hauled in waste pumping station. The increased capacity of the raw wastewater side of the station offers DELCORA the ability to meet EPA implemented combined sewer overflows (CSO) reductions. Because of the Consent Decree timeframe, the design and construction needed to be compressed in order to be operational by December of 2018. The project team (DELCORA, Gannett Fleming, Inc. and associated subconsultants) delivered a robust structural and geotechnical design based on the anticipation of traditional constructability methods. The design involved the preparation of a wet well style evaluation tool linked to HI 9.8 standards, allows inputs for flow, depth, rock excavation, and unit pricing. The General Contractor (Allan Myers) prepared an innovative approach to deliver the project and balance DELCORA's critical operational needs and juggle other projects at the WRTP which were already in progress. The GC delivered this approach using the following: 1. Support of Excavation (SOE) – The GC implemented an innovative SOE plan that utilized the excavation supports as the outer formwork for the concrete walls. The SOE was constructed in a way that portions of the whaler supports could be safely removed as various concrete pours cured in place. This approach limited the risk of affecting other utilities in the immediate area, eliminated the need for workers to backfill the area between the excavation and the SOE, and saved a significant amount of time. 2. Pile Elimination – One of the offerings of the contract was a value engineering clause that stated the GC could share in the cost savings to the owner for delivery of the project function. Due to soil conditions, the design team prepared a design based on numerous piles. GF reviewed the structural model and concurred that the deepest piles could be eliminated with modifications to the slab thickness, rebar and locations of construction joints. 3. Early Power – One of the GC's core directives was to bring power to the site as quickly as possible. This approach was a key component in the success of this project.

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206 * Thursday, August 29th, 2019 * 8:30:00 AM
John Moore, RK&K
Two Centuries of Fighting Waterborne Disease: The Battle Rages-On

Speaker Bio: John C. Moore is Director of Drinking Water at Rummel Klepper & Kahl in Baltimore, MD and has avre 30 years of engineering experience in water supply and treatment. He is a licensed professional engineer in various states and is a 28 year member of AWWA having chaired numerous committees and served terms as section Chair and Director.

Abstract: This presentation will focus on the accomplishments of the water drinking industry over the past two centuries in the fight against water borne disease from microbial contaminants and improving public health while also identifying the challenges that remain. Remarkably, science's understanding of "germ theory of disease" is relatively recent beginning with John Snow's removal of the Broad Street pump handle in London in 1854. In fact, disinfection practices involving chlorine has only been in widespread use for about a century. Prior to that, epidemics from waterborne diseases like cholera, typhoid fever, dysentery and many other diseases were rampant and played significant roles in reducing the life expectancy of populations in cities around the world. People today in advanced industrialized nations have largely forgotten about these diseases and are unaware of their correlation to public health and the associated economic impacts thanks in major part to the advancements of the drinking water industry. Unfortunately, death from these diseases is still widely prevalent today in developing countries. This presentation begins with educating the audience of the physical effects of these diseases and their consequences to civilizations both in the 1800's and today. The presentation then presents a timeline overview of the discovery of germ theory and major advancements in drinking water treatment and the associated impacts to society. Important people throughout history who have made major contributions towards improving public heath will be highlighted including such persons as John Snow, Louis Pasteur, John Fuller, Abel Wolman to name a few. While highlighting the accomplishments of the drinking water industry, the presentation also leaves the audience with the understanding that the fight against microbial contaminants such as cryptosporidium, giardia cysts, legionella, viruses E. coli, as well as typhoid and cholera still rages on. Due to time constraints, the focus of this presentation is limited to microbial contaminants only but does acknowledge the presence and importance of organic, inorganic and disinfection by-products in drinking water quality and public health. It is the goal of this presentation to leave the audience with a greater understanding and appreciation of the accomplishments that the drinking water profession has made towards improved public health and civilizations but that we still have a long way to go before we can claim victory.

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201 * Thursday, August 29th, 2019 * 9:00:00 AM

Gert van der Walt, DC Water

A Tiered Criticality Approach – Developing A Rehabilitation Plan Using InfoMaster

Speaker Bio: Mr. Van der Walt is a professional engineer with over 15 years of experience in strategic planning, feasibility studies, design, program and contract management of water supply and wastewater engineering schemes in the United States, the United Kingdom and South Africa. This includes more than ten years of experience working closely with public utilities, from being an embedded design lead with Thames Water through to managing the Water and Sewer Program Managers at DC WATER.

Abstract: Asset management tells us to spend our capital dollars on our highest risk assets, but how do you justify spending millions of dollars on a small mains program if those assets are considered low risk? Large diameter mains move water and convey sewage throughout a system, but it is the local small mains that are responsible for servicing the customer. The small mains cannot be simply ignored because a risk prioritization system scores them lower, so how do you justify spending money on these mains in the framework of your asset management plan? DC Water has developed a unique approach using the InfoMaster software and a tiered criticality approach. In late 2017, DC Water contracted Innovyze to develop an InfoMaster capital asset prioritization tool using their existing risk framework. The results of the prioritization tool showed DC Water's highest risk assets to be large diameter transmission mains, while the smaller, local assets were identified as lower risk. To meet DC Water's small main requirements within the logic of the asset management framework, DC Water developed custom rehabilitation decision trees using a tiered criticality approach. The decision trees serve as a road map to identify an actionable decision for each asset based on the risk score and the utility's rehabilitation goals and programs. These actions can then be packaged into future capital improvement projects. The tiered criticality approach divides the water and sewer pipeline system into four groups or "tiers" based on the calculated COF, giving a unique view of the system based on criticality. The tiers resulted in the large diameter pipelines being grouped into the highly critical Tiers 3 and 4, while small diameter pipelines were grouped in the less critical Tiers 1 and 2. A distinct rehabilitation decision tree with specific rehabilitation actions and timeframes was developed for each tier, taking into account the tier's criticality and the size of the assets. The tier system is allowing DC Water to prioritize the rehabilitation of assets while still being fiscally responsible in the spending. DC Water, is currently commissioning the system and it is anticipated to be fully implemented to define future capital improvement program (CIP) in Spring 2019. This presentation will include: 1. Key aspects of the prioritization matrix and InfoMaster development 2. What is a rehabilitation decision tree and how does can it help? 3. Developing and incorporating the Tiered Criticality Approach 4. Development of rehabilitation actions for each criticality tier Defining CIP projects based on the decision tree and lessons learned

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202 * Thursday, August 29th, 2019 * 9:00:00 AM
Liliana Maldonado, Alexandria Renew Enterprises
Critical Separation: AlexRenew's Solution to a Fast-Track CSO Remediation Program

Speaker Bio: Liliana Maldonado joined AlexRenew in 2017 as the director of RiverRenew, a clean water program that mitigates potential sanitary sewer overflows from wet weather events and addresses combined sewer overflows from the City of Alexandria's combined collection system. As Chief of Engineering and Planning, she is responsible for the overall implementation of all design and construction projects, including RiverRenew. She wants the Alexandria community to know that she is proud to lend her expertise to this program in order to achieve healthier waterways for all of Alexandria.

Abstract: The City of Alexandria is a nationally designated historic district founded in 1749 with more than 900 acres of parks and dedicated public space. Like many older cities in the United States, the City is served by combined sewers, which during periods of intense rainfall, discharge excess flows into local waterways via permitted combined sewer overflow (CSO) outfall structures. In April 2017, the Virginia General Assembly passed a new law requiring an accelerated schedule to address the discharge of combined sewage to Alexandria's waterways by mandating remediation of the four existing CSO outfalls within the City. In response to the new Law, Alexandria Renew Enterprises (AlexRenew), with support from the City of Alexandria, developed the RiverRenew Program to meet the new regulatory requirements. RiverRenew is the largest infrastructure initiative in the history of Alexandria, VA with an estimated capital construction cost of $400 million. The Program encompasses four major projects: a storage and conveyance tunnel system, upgrades to AlexRenew's primary pumping capacity at its wastewater plant, relocation of facilities and decommissioning of AlexRenew's former administrative building, and a wet-weather treatment system. The Schedule stipulated by the 2017 Virginia State Law requires that the Tunnel System - the largest of the four projects and other controls to be in place by July 1, 2025. Construction of the tunnel system is anticipated to begin in December 2020 to meet the legislative deadline. As a result, AlexRenew and their Owner's Advisor are working expeditiously on a parallel track to advance conceptual-level designs, comply with the National Environmental Policy Act through the development of an Environmental Assessment with the National Park Service, and acquire the necessary permits and agreements needed to build the Tunnel System. In addition, AlexRenew and their Owner's Advisor are simultaneously developing procurement methods for the Program, analyzing potential impacts on the community and cultural and environmental resources, investigating risks associated with alternative tunnel alignments, and evaluating innovative construction techniques to minimize cost. This presentation will provide an overview of activities completed to date by AlexRenew, which include submittal and approval of the Long Term Control Plan Update, development and approval of the Preliminary Engineering Report, environmental permitting, and selection of procurement strategies. The presentation will also forecast upcoming activities to support and maintain the fast-track Program schedule.

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203 * Thursday, August 29th, 2019 * 9:00:00 AM

Tanja Rauch-Williams, Carollo Engineers

Why consider P recovery and how to select the right technology for your WRRF

Speaker Bio: Dr. Tanja Rauch-Williams serves as Carollo's Wastewater Innovation Lead and Principal Technologist with more than 20 years of experience in wastewater treatment, water reuse and applied research. Her work has focuses on wastewater treatment optimization for biological nutrient removal and resource recovery, energy optimization, and trace organic removal. Tanja is co-chair of the Rocky Mountain Innovative Water Technologies Committee, and local affiliate of the Leaders Innovation Forum for Technologies (LIFT).

Abstract: Phosphorus recovery technologies have entered the North-American and European domestic wastewater market about a decade ago. To date, about 20 water resource recovery facilities (WRRFs) in the US have full scale implemented P recovery systems in their treatment process. The drivers for implementing P recovery systems differ by utility and may include O&M cost reduction drivers, effluent permit nutrient compliance, and resource recovery objectives. In a recent study funded by the Water Environment Foundation (WEF) entitled "Preparation of Baseline Data To Establish the Current Amount of Resource Recovery" the authors estimated the current status of phosphorus recovery nationwide in the U.S. as 21 percent of all phosphorus entering WRRFs, or about 68,000 metric tons per year (Rauch-Williams et al., 2018). Of all phosphorus entering WRRFs in the U.S., it is further estimated that about 1 percent is recovered at this time as struvite from installed P recovery technologies across the U.S. It is WEF's objective to increase this portion in the coming years. In 2017, as part of the start of a P recovery design for a WRRFs in the Midwest of the U.S., the authors of this paper undertook a detailed review and evaluation of the technology alternatives currently available in the U.S. for P recovery. To date, four P recovery technologies are commercially available in the U.S. that have been implemented by WRRF or are currently in design (in no particular order): AirPrex (CNP), Multifom Harvest, Schwing Bioset (aka NuReSys, Pearl (Ostara). This presentation will summarize the results of a comprehensive compilation of practical experiences made in and outside of the U.S., many of which have been visited by the authors. This summary will benefit a broad audience of designers, operators, regulators, and WRRFs owners assessing P recovery options for their facilities and provide guidance on criteria to consider when deciding on the best technology fit for a specific facility. The following criteria will be discussed when assessing similarities and differences between different technology solutions: Phosphorus removal and recovery efficiency.Capital and O&M costs (including energy and chemical consumption).Quality of the final product and marketability.Potential dewatering improvements.Process and equipment reliability and robustness.Flexibility of process configurations.Pre- and / or post digestion implementation.Ease of operation.Ease of maintenance. Complexity of control systems and integrability into existing systems.

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204 * Thursday, August 29th, 2019 * 9:00:00 AM

Sara Titus, WSSC

Evaluation of Acoustic and Satellite Leak Detection Technologies and Preliminary Development of Large-Scale Leak Detection Program.

Speaker Bio: Sara Titus, P.E., is the Engineering Research Specialist for Washington Suburban Sanitary Commission (WSSC). Mrs. Titus is part of the innovation team at WSSC and is focused on finding and evaluating new technologies and processes for the water and sewer networks with the goal of solving the Commission's challenges in a sustainable and cost effective way.

Abstract: Washington Suburban Sanitary Commission (WSSC) is one of the largest water and water resource recovery utilities in the United States, serving approximately 1.8 million customers. WSSC relies on customer complaints to locate leaks that have surfaced in the water distribution system. In order to locate leaks that have not surfaced, WSSC has leak detection crews who perform surveys on approximately 400 miles of pipe per year, taking approximately 12 years to survey the entire system. Several technologies on the market promise to better target WSSC's leak detection efforts and potentially make the leak detection crews more efficient. WSSC pilot tested two acoustic technologies and one satellite technology. Session participants will learn about WSSC's approach to pilot testing, how results were evaluated, and how they informed WSSC's approach to leak detection moving forward. The next phase will be a larger-scale utilization of one of the technologies tested beginning in mid-2019. An update on the implementation plan as well as preliminary data will be shared.

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205 * Thursday, August 29th, 2019 * 9:00:00 AM

Steve Henning, Vortex Companies

Rehabilitation of 125' Deep Leaking Brick Manhole Leading to Degraded 350', 78" x 66", Egg-Shaped Brick Culvert Utilizes Geopolymer Mortar & Precision Application Processes

Speaker Bio: As VP/Technical Director for the Vortex Companies, Mr. Henning offers over 35 years of technical expertise in environmental and wastewater infrastructure rehabilitation. He is an active NASSCO trainer with 14 years of experience conducting PACP, LACP, MACP and ITCP certification. His technical resume includes authoring ASTM standard practices, most notably, ASTM F-2551 Standard Practice for Installing a Protective Cementitious Liner System in Sanitary Manholes. He is also heavily involved in field inspection operations, personally inspecting major project sites.

Abstract: This presentation includes detailed insight to the rehabilitation of a 125' deep, 8' in diameter manhole that connected to a 350 LF, 78" H x 66" W egg shaped storm culvert that discharged into a nearby river. Located in Lakewood, OH, a suburb of Cleveland, both the manhole and storm culvert were constructed in the early 1900s and were suffering from severe infiltration and degradation. Due to the depth and diameter of the manhole, combined with the length and shape the culvert, the engineering design was extremely complex. Adding to the project's difficulty was the physical location of the manhole - which was on a busy thruway located at the edge of a very steep cliff. This alone limited the method of rehabilitation. Ultimately, the Quadex Lining System and GeoKrete Geopolymer were selected to structurally rehabilitate both. Several key factors drove this decision: An advanced application process, the versatility of GeoKrete Geopolymer, an experienced engineering team and installation crew and a small construction footprint. The project presented a number of challenges, including the careful removal of several extremely heavy baffles throughout the depth of the deteriorated and crumbling manhole. Also, its depth required a special crane operation and procedure for the crew be lowered and raised inside the manhole for the prep, cleaning, infiltration control and application processes. During the course of the project the weather - that ranged from very warm with heavy rains to very cold and snowy with gusting winds - forced the crews to develop innovative solutions to work around the wind and weather conditions. In addition to the fully structural rehabilitation of the manhole, the crew also cleaned, prepped and structurally relined the 350 brick culvert, which was in extremely poor condition and was experiencing I/I in several locations throughout its length. Regardless, the entire project was completed within the allotted time frame and within budget. We have captured the entire rehabilitation process through a series of photographs and videos.

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206 * Thursday, August 29th, 2019 * 9:00:00 AM
William Lipps, Eurofins Eaton Analytical, Inc
UCMR4 - What are we seeing for the first half and what are the issues?

Speaker Bio: Mr. Lipps has a thorough understanding of the development of chemical methods for environmental, pharmaceutical, & chemical analysis. He has worked as the Chief Scientific Officer at Eurofins Eaton Analytcial for the past year and is responsible for overall technical guidance of the multi-state certified laboratory, providing insights into emerging issues for which the lab should develop capabilities. He also serves as the primary external laboratory resource, presenting at numerous national conferences. He has a BS in Geology and Chemistry at StephenFAustinStateUniversity,

Abstract: By the time of the conference we will have completed 18 months of UCMR 4 monitoring. It is important to know as soon as possible if we are likely to see anything significant in these sampling rounds, especially as planning begins for UCMR 5 in just a few short years. In this presentation we discuss both the logistical issues we have seen thus far in UCMR 4 and the findings to date from our labs, which account for samples from > 500 utilities nationwide. UCMR 4 has presented some unique logistical challenges for both water systems and for laboratories. Several of the methods (541 for alcohols and 530 for pesticides) were found to have sample acceptance criteria (pH) that were not consistent with actual observations of pH, indicative of the fact that these were very new methods that had not been tested under a wide variety of conditions. The result of this was that within the first 3 months of UCMR 4, USEPA widened the acceptance criteria for those two methods, but not until after several labs, including our own, required utilities to do multiple rounds of resamples. Anecdotally apparently several UCMR approved labs independently adjusted preservative amounts to minimize these problems. Now that algal toxin monitoring has begun we have observed at least one utility with a unique water type such that the method 544 buffer will not bring the sample within the acceptable pH range, again demonstrating that several of these methods have not yet been rigorously field tested. In most cases, laboratories bemoan issues with meeting QC criteria on new methods, but these methods demonstrate instead the challenges with field related issues. Amongst our two labs, we expect samples in 2018 from more than 500 utilities, creating a robust initial dataset to review for trends. UCMR 4 continues the UCMR 3 trend of using reporting limits that are reflective of the capabilities of the analytical methods rather than arbitrarily higher limits, so what are we seeing? UCMR 4 requires the use of up to 10 individual methods, 3 for cyanotoxins (544, 545, 546), 1 for DBPS (HAA9 by 552.3 or 557), 3 for organics (525.3, 530, 541), 1 for metals (200.8) and 2 for source water indicators (TOC and Br). Results of > 750 bromide results to date show wide variations, to > 1 ppm bromide in some cases. Similarly, HAA9 in some cases are double the HAA5 numbers, but those are generally still well below the HAA5 MCL. An unexpected finding is the presence of 1-butanol (EPA 541) in some systems (2% of samples to date), sometimes at levels exceeding 10 ug/L. Likewise quinolone (EPA 530) has been detected in a small number of samples, but at very low levels. Germanium has been detected in >10% of samples to date, and manganese in >60% of samples, in some cases at levels exceeding 100 ug/L. To date we haven't seen detections of either microcystins or cylindrospermopsin/ anatoxin-A but it is still very early in the bloom season.

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201 * Thursday, August 29th, 2019 * 9:30:00 AM
Tory Wagoner, P.E., Cavanaugh & Associates, P.A.
A Non-Revenue Water Tale of Five Cities

Speaker Bio: Tory Wagoner is a Principal and Director of Operations at Cavanaugh, working here for 16 years. Tory earned his Civil Engineering Degree from NC State University. Tory's main focus is Non-Revenue Water providing technical oversight and design support, and is meter and billing system lead analyst for all of Cavanaugh's AWWA Water Auditing and Loss Control Program work, and specializes in training utilities in Water Efficiency, Water Loss Management and Metering Programs, and completed Masters Level training internationally with Allan Lambert, "Godfather of Leakage Control."

Abstract: As Non-Revenue Water (NRW) gains some serious momentum in the water industry, the adoption of the AWWA M36 method for water auditing and loss control continues to spread. But while the methodology is universal – proven application of principals that are effective for systems of all sizes – the implementation of the M36 methodology can look a bit different from one utility to the next. This analysis presents a comparison among 5 water utilities from across the United States, varying from a few thousand to a few hundred thousand connections – across varied regions and climates. Each utility has embraced the AWWA M36 method, each employing formal programs for focus teams & accountability, water auditing, data validation, apparent loss control through meter testing, meter remediation, & billing analytics, and real loss control through sectorization, leak detection and pressure management. As each water system has its own set of unique physical (system parameters) and economic (cost to produce and deliver, revenue rate structure) conditions, then both the business case for water loss intervention as well as the actual intervention strategies were highly specific to the system. In addition to the specific approaches for each of the 5 utilities, an examination will be presented on the variation in results achieved by each utility, as well as the variation in drivers for the initial establishment in each program. Common elements will also be examined. Presentation participants will gain an understanding of the AWWA M36 methodology and its applicability to their water system for water and revenue recovery.

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202 * Thursday, August 29th, 2019 * 9:30:00 AM

Miranda Santucci, Jacobs

10 Years of Progress – WSSC's GHG Inventory Report Card

Speaker Bio: Miranda Santucci is a water engineer with Jacobs in Silver Spring, Maryland. Ms. Santucci has 9 years of experience working on water supply and wastewater collection systems analysis and planning and flood analysis. She has a BS in Biological Resources Engineering from the University of Maryland and is a registered professional engineer in Maryland.

Abstract: In 2018, the International Panel on Climate Change (IPCC) issued a special report highlighting the need for comprehensive greenhouse gas (GHG) emissions reductions to prevent global warming in excess of 1.5°C above pre-industrial levels. This latest report has brought a renewed sense of urgency to many local governments and utilities to develop aggressive plans to curtail GHG emissions. For example, the state of Maryland adopted a goal to reduce GHG emissions by 80% from 2005 levels by the year 2050. Montgomery County has recently restated their commitment to reductions by passing a resolution to achieve zero GHG emissions by 2035. The water and wastewater industry is a significant contributor to GHG emissions. The United States Environmental Protection Agency (USEPA) lists wastewater as the fifth largest global emitter of anthropogenic methane. The Washington Suburban Sanitary Commission (WSSC) provides water and wastewater services to an estimated 1.8 million residents in Maryland. As part of a climate adaptation and mitigation effort, WSSC has developed annual GHG emission inventories (2005 through 2017) and GHG Action Plans. The Action Plan outlines strategies for reducing GHG emissions to meet WSSC's goal of 10% reduction every 5 years through 2050 below the baseline year 2005. WSSC's GHG mitigation strategies are aimed at improving building, system, and equipment efficiency; expanding resource recovery operations and use of renewable resources; and increasing fleet efficiency. Mitigation projects include recovering energy from biosolids and purchasing clean energy to power facilities. WSSC's planned Piscataway Bio-Energy Project, for example, will reduce emissions from transportation and chemical stabilization of biosolids while also producing renewable energy. The future GHG emissions impact of mitigation strategies are estimated as part of the annual WSSC GHG Action Plan update. GHG inventories are developed to provide information on long-term trends. Reporting methodology may change due to emerging science or improvements in accessibility to accurate input data. The operational assets and business processes of a water/wastewater utility may also change over time. Guidance for development of GHG emission inventories are provided by the IPCC and The Climate Registry (TCR), among others. Water and wastewater utility inventories are comprised of direct (Scope 1), indirect (Scope 2) and other reportable indirect (Scope 3) GHG emissions. Often, Scope 2, which includes emissions from purchased energy, is the largest source category for water and wastewater utilities. Recent issuance of the TCR's General Reporting Protocol (GRP) Version 2.1 has altered the approach to calculation of Scope 2 emissions to increase transparency and prevent double-counting of Renewable Energy Certificates (RECs). Supplier-specific emissions factors for WSSC's purchased energy mix was obtained to ensure calculated emissions were not implicitly including regional renewable energy sold as RECs. Understanding the new guidelines is important for utilities that rely on RECs for reducing their GHG footprint. This presentation will highlight how the WSSC GHG inventory methodology has been modified to accommodate the latest changes in Scope 2 guidance. The presentation will also discuss the projected impacts of the WSSC's Piscataway Bio-Energy Project, anticipated to be brought online in 2022.

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203 * Thursday, August 29th, 2019 * 9:30:00 AM
Christopher Cusic, DC Water
Starting of the DEMON

Speaker Bio: Christopher Cusic has worked in wastewater for over 18 years. Working at Charles County Government in package Plants for 7 years and obtaining a Class 3 A license. Working at Blue Plains Advanced Wastewater Treatment Plant as a operator for 8 years and then becoming a Operations Support Specialist. I have trained operations with process upgrades, reviewed SOPs, operations maintenance coordinators and have worked on special projects.

Abstract: The DC Water Blue Plains Advanced Wastewater Treatment Plant, operates at 385 MGD meeting Total Nitrogen and Total Phosphorus discharge limits DCW implemented the thermal hydrolysis process and anaerobic digestion in conjunction with deammonification (DEMON process) of the high ammonia filtrate side stream from our belt filters presses. Rather than purchasing a vendor control package, DCW focused on integrating the controls allowing for the development of a control system with great flexibility, providing the opportunity to utilize three unique control modes. After seeding of each reactor, control modes were implemented as the project and biological needs developed. Intermittent Feed Timed Mode was first applied and was instrumental in observing the activity of AOBs by creating time NO2 profiles across the aerobic and anoxic steps. This allowed time for AOBs spent creating NO2 and Annamox consumed Ammonia and NO2. Excess aeration time allowed NOBs to consumed air and NO2 creating detrimental NO3. Continuous Feed Timed mode was to establishment of Aerobic and Anoxic time ratios in each reactor that allowed higher loading rates to each reactor while maintaining consistent Aerobic and Anoxic ratios. This learning tool, requiried detailed understanding of online process parameters in conjunction with analytical data and daily calculation of setpoint changes. With a confident understanding of the reactors health the third control mode was implemented, pH Control mode. pH Control mode regulates the reactor feed and air flow setpoints based on a pH and DO dead bands and is intended to be the mode used in steady state.

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204 * Thursday, August 29th, 2019 * 9:30:00 AM

Jonathan Reuther, Mott MacDonald

Flow by Night: Keep a SCADA Outage From Shutting Down Your System

Speaker Bio: Jonathan Reuther is a Senior Project Engineer with Mott MacDonald in Philadelphia. He has broad experience working with water and wastewater utilities to prepare designs, studies, and SOPs related to pumping stations water treatment plants, wastewater treatment plants, and linear assets. He graduated from New Jersey Institute of technology with Bachelors and Masters degrees in civil engineering.

Abstract: Utilities face the urgent need to document knowledge of their systems held by operators and maintenance personnel that are retiring. As new operators take their place, it is critical to provide proper training and implement clear written procedures. Well-written SOPs reduce risk for utilities by providing documentation of a system's components, outlining clear procedures for normal operations, and providing alternate operational modes in anticipation of system failures. Mott MacDonald is developing SOPs for DC Water's water pumping stations including monthly inspections, annual inspection and critical equipment testing, SCADA Control, and Local/Emergency Operations. A central component of pump station and treatment plant resilience is the staff's ability to run the facilities manually in the event of a SCADA system or remote site communications failure. For DC Water's pump stations, this required documentation of local control panels as well as development of an entirely different mode of operation for each pump station. DC Water has a total of four water pumping stations that are controlled as follows: 1. The two largest water pumping stations have constant speed pumps that operate based on remote tank level signals to maintain level setpoints. Operating constant speed pumping stations to maintain tank level becomes difficult when tank level signals are no longer available. Developing a local operations procedure for these pumping stations required analysis of SCADA Historian data to understand where discharge pressure can be correlated with tank level at various discharge flows. This allows operators to safely estimate tank level based on local discharge pressure. 2. The two smaller water pumping stations are equipped with VFDs and operate in discharge pressure control mode. Operation of pressure-controlled pumping stations with VFDs during a SCADA outage is relatively simple and involves manual pump speed adjustments and use of discharge pressure relief valves (PRVs) to "trim" the pressure. Developing clear and useful SOPs requires extensive input including pump station walk-throughs with staff at all levels. Effective SOPs are tailored to the needs of the staff that will be using them. A Local/Emergency Operations SOP needs to document local control components (local instrumentation displays, local control panels, VFD interfaces, and valve control stations) accurately and in sufficient detail so that the SOP can be relied upon in an emergency to guide operators through an unfamiliar process. Equipment and PLC interface photographs are annotated and used extensively throughout the SOPs to clearly identify requirements. Operations staff has provided highly positive feedback on the usefulness of the SOPs in understanding manual operations tasks. As an added benefit, the SOP development process spurred many useful conversations on how resiliency in pump station operations could be enhanced. This presentation will outline the process used for: Obtaining operator input to capture existing procedures and knowledge from the perspective of experienced utility staff; Analyzing SCADA data and developing a robust approach to local/manual pumping station operation using locally available data; Graphically documenting how pumping stations are controlled in local/manual mode during a PLC or SCADA outage.

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205 * Thursday, August 29th, 2019 * 9:30:00 AM

Joshua Rodgers, HDR

Influent Junction…What's Your Function!? [A Complex Collaboration Effort under a CMAR]

Speaker Bio: Josh Rodgers is a water/wastewater engineer and project manager with 14 years of experience in the industry. He has a Bachelors in Mechanical Engineering from Virginia Tech and a Masters in Environmental Engineering from Johns Hopkins. Josh is currently the Team Leader for HDR's Fulton, MD office.

Abstract: The "Improvements to the Headworks and Wet Weather Flow Equalization" project (918H) at Back River Wastewater Treatment Plant is necessary to meet the requirements of an EPA consent decree to mitigate sanitary sewer overflows in the City's collection system. A critical aspect, if not the most important, of the project is to create a "free fall" condition within the influent conduits to create a hydraulic separation between the collection system and the treatment plant. This free fall condition at peak flows of 752 MGD is accomplished with the addition of an Influent Junction Chamber (IJC) to be built over two influent conduits, which are vastly different in age and construction type, to direct flow to the new preliminary treatment facilities which include coarse screens, influent pumping station, fine screen facility and grit removal facility. Since the delivery method for the project is Construction Manager at Risk (CMAR), the CMAR, City and Design Team focused on the IJC as a value engineering opportunity to reduce construction costs, lessen risk, and condense the construction timeline. The value engineering effort encompassed different technical aspects of significant complexity that spanned across numerous disciplines and challenged staff from each respective CMAR project team member, with each entity focused on providing the City with a regulatory compliant solution that benefits the project in as many ways as possible. Design Team personnel engaged City Wet Weather Program modelers to establish acceptable boundary conditions to maintain "free fall" in the influent conduits to meet technical compliance of the Consent Decree. Structural engineers collaborated with CMAR staff, concrete subcontractors, and support of excavation (SOE) subcontractors to identify a myriad of design and construction alternatives to reduce materials and labor costs, minimize sheeting/shoring, reduce depth of excavation, and shorten the construction duration of the IJC. With those alternatives in mind, the Design Team engaged national hydraulic modelers to perform extensive modeling iterations via CFD (computation fluid dynamics) software to determine which potential IJC alternatives would satisfy the previously established and approved boundary conditions in the influent conduits. Results from the hydraulic modeling will be used to identify the best all around alternative for the IJC design revision and construction approach. Additionally, during construction the project Team was faced with a compromised influent flow conduit that resulted in emergency coordination between all team partners. Various rehabilitation approaches and hydraulic scenarios were evaluated and a temporary fix was developed to keep construction moving forward. The above extensive and technically challenging collective effort between all members of the project team is a textbook example of one of the best attributes to a CMAR delivery method… collaboration.

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206 * Thursday, August 29th, 2019 * 9:30:00 AM
Paul Nyffeler, AquaLaw PLC
Getting the Lead Out - Dealing With Our Country's Lead Pipe Legacy

Speaker Bio: Dr. Paul Nyffeler is a senior associate at AquaLaw, after nine years in the litigation practice at a major international law firm. In addition to his environmental and general litigation experience, Paul brings a deep scientific background, with his Ph.D. in chemistry.

Abstract: The United States banned the use of lead in plumbing in 1986, yet over thirty years later, front page news stories on the discovery of lead-bearing drinking fountains are a regular occurrence across the country. The catastrophic failure of Flint, Michigan, to protect its residents from lead poisoning has led to a resurgence of interest in removing the potentially toxic metal from our drinking water distribution systems. This presentation will summarize key aspects of the existing federal Lead and Copper Rule (LCR), as well as the proposed revision to the LCR planned for release next year. Another focus of the presentation will be on schools and child care facilities (which are exempt from the LCR), efforts to help detect lead-containing drinking water fixtures in those facilities, and some of the common pitfalls to engaging local governments to implement testing.

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201 * Thursday, August 29th, 2019 * 11:00:00 AM

Eric Caldwell, Fairfax County Stormwater Maintenance

Transitioning Stormwater Facility Maintenance from Reactive to Proactive: An Experiment in Risk Assessment and Predictive Analytics

Speaker Bio: Eric Caldwell posses a B.S. in Plant and Soil Science, and an M.S. in Environmental Science. He currently works with Fairfax County Stormwater Management in northern Virginia. Responsibilities include the routine and non-routine maintenance of almost 1,500 public stormwater ponds. Routine maintenance consists primarily of facility mowing, unblocking, and channel cleaning. Non-routine maintenance restores facilities to their design specifications, primarily by sediment removal and erosion repair. This work requires a yearly budget of approximately 1 million dollars.

Abstract: Fairfax County, is a rapidly developing municipality located in northern Virginia. Currently, sustainable growth is supported by an inventory of 1,438 stormwater retention ponds, consisting of: dry ponds, wet ponds, extended detention ponds, regional ponds and state regulated dams. The Stormwater Maintenance Program consist of routine and non-routine maintenance. Routine maintenance includes: mowing, channel cleaning, debris removal, and unblocking of inflows and outflows. Non-routine maintenance restores the facility to design specifications, including: sediment removal, erosion repair, channel re-establishment, undesirable vegetation removal, and stabilizing vegetation re-establishment. The large number of facilities and the limitations of resources creates a program that often prioritizes and reacts to already developed problems. Routine work maintains facility functionality for longer periods of time, and can be preventative of larger, costly and environmentally detrimental non-routine maintenance work. To maximize the efficiencies of proactive routine maintenance frequency on a site to site basis, we evaluated the use of ArcGIS data analysis as a tool to develop a maintenance management program focused on risk assessment and predictive analytics to help better forecast routine and non-routine maintenance. ArcGIS allowed us to spatially place each facility with respect to edaphic and physiographic conditions in each facility watershed. Data points that may influence maintenance conditions include: erosion factors of site soils, slopes, percentage of impervious surfaces, and historical maintenance. Risk analysis includes factors such as: soils that will be difficult to establish vegetation, as well as facility proximity to impaired streams, riparian protection areas and dense residential communities. Combining this information spatially and visually allowed patterns and groupings to emerge showing facilities and geographical areas with higher associated risk of failure, therefore a need for a higher frequency of maintenance and vice versa. This information can also be used to guide seasons when non-routine work would be most effectively performed and effective seed mix selection. This information is planned to be used to help more efficiently dedicate resources toward maintenance and avoid costly and environmentally detrimental, large non-routine activities. This presentation will share our process, lessons learned, how we hope the program will be utilized, and provide insight regarding asset management software and data collection planning that may be helpful in implementing such a program.

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202 * Thursday, August 29th, 2019 * 11:00:00 AM

Daniel Gilroy, CDM Smith

Emergency Bypass Procedures for Arlington County's Wastewater Pump Stations

Speaker Bio: Mr. Gilroy is a Principal and Senior Project Manager with CDM Smith, and a registered professional engineer in Virginia, Maryland and the District of Columbia. He holds a Bachelor of Science degree in Engineering from the University of Rochester and a Master of Science degree in Civil Engineering from Virginia Tech. He has expertise in the planning, design, and construction of water and wastewater conveyance systems, including pipelines, pump stations, gravity sewers and water main distribution systems.

Abstract: Arlington County, located in Northern Virginia on the southwestern bank of the Potomac River directly across from Washington, D.C., owns and operates 13 sewage pump stations. The County is concerned about the impact of force main failure on its ability to provide reliable wastewater collection service to its customers. Emergency bypass procedures manuals were developed to provide details on pump station bypass operations, in the event that a force main failure occurs and is required to be taken out of service. Daily average and peak flow data were evaluated to determine bypass pumping requirements and sizing. Pump station visits and discussions with maintenance staff were performed to select the best approach to provide a unique solution for each pump station in case of force main failure. The manuals serve as a guide for the County's maintenance department to expedite the setup of emergency bypass pumping operations. Multiple bypass alternatives were developed for each pump station. Bypass approaches considered the use of temporary bypass pumps versus installation of quick connections to retrofit and make use of the existing pumps inside the pump station. Drawing suction from either the existing pump station wetwell or a bypass manhole was evaluated. Minimizing disruption to the local community during bypass pumping operations was of paramount concern. Working closely with the County and a bypass pump supplier, a detailed list of materials and equipment was identified for each pump station. The manual included detailed figures showing bypass piping length and piping alignment route to the discharge manhole for the pump station. This presentation will discuss the challenges faced to provide pump station bypass standard operating procedures and the benefits of up front planning documents available for use in an emergency during failure conditions.

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203 * Thursday, August 29th, 2019 * 11:00:00 AM

Joseph Jacangelo, Stantec and The Johns Hopkins University

Comparative Inactivation of Norovirus and MS2 Bacteriophage by Peracetic Acid and Monochloramine in Municipal Secondary Wastewater Effluent

Speaker Bio: Dr. Jacangelo is a Vice President and Director of Research for Stantec. In addition to his role at Stantec, Dr. Jacangelo is an adjunct faculty member at the Johns Hopkins University Bloomberg School of Public Health. He is a past chair of the Board of Directors of the WateReuse Research Foundation, is currently a Board Member of the American Water Works Association and Chair of that organizations International Council. He is the recipient of two AWWA best papers award and a past recipient of the AWWA Volunteer of the Year award.

Abstract: Introduction. Disinfection of municipal wastewater (MWW) is critical to controlling release of pathogenic microorganisms such as viruses into receiving waters. Chlorination remains the most common method for disinfection of MWW largely due to its low cost and acceptance among regulatory agencies. There is a growing interest in alternatives to chlorine-based disinfection of MWW in part due to tightening regulations on DPBs in MWW effluents at the state level. Consequently, there has been increasing interest in peracetic acid (PAA) for disinfection of MWW. PAA requires no post-treatment neutralization, and DBPs formed by PAA are mostly carboxylic acids that have less mutagenicity, carcinogenicity, and genotoxicity than halogenated DBPs produced from chlorination and chloramination. Because there are no identified data in the literature on inactivation of norovirus (NoV) by PAA and monochloramine in MWW, the objective of this study was to comparatively assess at bench scale these disinfectants using murine norovirus (MNV) as a surrogate virus. Additionally, inactivation of MNV was compared to the more commonly employed surrogate MS2 bacteriophage Summary of Findings. To date, there are limited data directly comparing the virucidal effectiveness of PAA to more common disinfectants. This study compared the effectiveness of PAA and monochloramine in reducing infectivity of MS2 and MNV in MWW. Our data showed that PAA and monochloramine have similar efficacy on MS2 infectivity reduction in MWW. Neither disinfectant was able to achieve more than 1-log reduction of MS2 at CT values up to 800 mg-min/L. In contrast, monochloramine was more effective in inactivating MNV than PAA. At a CT value of approximately 20 mg-min/L monochloramine achieved approximately 2.5-log reduction of MNV while PAA only achieved about 1-log reduction. At a CT value of 40 mg-min/L the difference in the effectiveness of the two disinfectants was less pronounced, with monochloramine achieving approximately 3-log reduction of MNV while PAA achieved approximately 2-log reduction. Practical Implications. The 1-log CT values for MS2 reduction by monochloramine and PAA were 1,228 mg-min/L and 1,254, respectively. However, CT values for MNV reduction were much lower, with 4-log infectivity reduction achieved at CT's under 100 mg-min/L for both disinfectants. Thus, regulations and subsequent WWTP disinfection practices informed by MS2 inactivation data will likely be protective for public health. However, these disinfection practices will also be overprotective for MNV and may lead to unnecessary costs and excessive disinfection by-product formation. E. coli inactivation data demonstrated that operational CT values for WWTP disinfection processes to achieve 3-log bacterial reduction, around 30 mg-min/L, are sufficient to achieve predicted MNV reductions of over 3-logs using monochloramine and nearly 1-log using PAA. Thus E. coli reduction may be a good indicator for MNV reduction in municipal wastewater disinfection processes.

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204 * Thursday, August 29th, 2019 * 11:00:00 AM

Meric Selbes, Hazen and Sawyer

Frazil Ice Intake Challenges - Balancing Environmental Impacts with Plant Operations

Speaker Bio: Meric Selbes received his PhD in Environmental Engineering in 2014, winning an academic achievement award for his dissertation on NDMA formation. His areas of expertise includes oxidation/disinfection, regulated and emerging DBPs, carbon adsorption, membrane treatment and biologically active filtration. He has co-authored 20 peer reviewed publications. He is currently working at Hazen and Sawyer as a Principal Scientist on drinking water projects in the DC, Maryland and Virginia area.

Abstract: WSSC provides some of its customers with finished drinking water from the Potomac water filtration plant (WFP). At the Potomac WFP, raw water is withdrawn from the Potomac River via an intake structure with a bar rack and pumped up to the WFP via raw water pump stations. During winter months, frazil ice crystals present in the Potomac River can adhere to the bar racks, bridge across adjacent bars, and restrict water from flowing to the raw water pump station wet wells. If the raw water intake is not functioning normally or its capacity is hindered, the plant can be at the risk of not producing enough water. Analyses of historical data showed that frazil ice formation on the bar screens typically occurs during low-flow and freezing conditions during the winter months. The typical duration of winter weather conditions conducive to frazil ice formation is about two months, typically during January and February. The duration may be shorter or longer for any particular winter. The goal of this study was to evaluate potential methods for controlling frazil ice formation on the existing raw water intake. A utility survey was conducted to include nine water treatment plants with similar intake characteristics in regions that experience frazil ice. The utility survey identified whether or not the utility had historical issues dealing with frazil ice, how they handled these problems, and which strategies they have been using to maintain plant operations. With the feedback from the survey, thirteen frazil ice treatment alternatives were identified and evaluated. Due to the layout of the existing intake structure, or high costs associated with some of the alternatives, four options were identified from the thirteen as potential frazil ice treatment alternatives for WSSC's intake structure. The most commonly utilized frazil ice treatment alternative identified by the utility survey was the use of compressed air lines connected to diffuser grids located in the water intake structures. This method works by using a blower to introduce a high volume of pressurized, heated air to a coarse bubble diffuser system located directly underneath and/or in front of the intake screens. The resultant mixing zone pushes suspended ice particles to the surface and mitigates the conditions necessary for frazil ice to accumulate and adhere to the intake screens. As an air diffuser system is a commonly utilized solution, its potential applicability at WSSC's intake is further evaluated. This presentation will present the approach utilized for selecting the appropriate strategy(ies) for controlling frazil ice at Potomac WFP's intake structure.

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205 * Thursday, August 29th, 2019 * 11:00:00 AM

Lawrence Latour, Hazen and Sawyer

Forensics of a Successful Stream Restoration and Sewer Asset Protection Project – Design, Construction, and Reality

Speaker Bio: Lawrence Latour is a Registered Professional Engineer with Hazen and Sawyer. He received a Bachelor of Science in Environmental Engineering from the University of Delaware. He has 8 years of conveyance experience in studies, design and construction management. He has designed over 50 miles of sanitary sewer rehabilitation and recently completed a large construction project that included stream restoration.

Abstract: Preliminary engineering and subsequent detailed design were completed for a large scale sanitary sewer repair, replacement, and rehabilitation (SR3) program within the Piscataway Sewershed Basin in Prince George's County. This program included the design of 16 miles of access path to repair over 18 miles of SR3 pipe, 500+ SR3 manholes, and 30 exposed sanitary sewer assets located within streams and stormwater outfalls. Stream restoration designers developed over two dozen Priority I-IV designs to restore stable channel form and function based on sewer asset location, site constraints, and erosion severity. Design began in early 2011 with construction beginning in December 2015, following a length environmental permitting process. Construction completion is expected by March 2019. During construction, designers worked on-site hand-in-hand with the owner and contractors to ensure the sewer assets would be protected long-term. Stream design decisions were carefully made to ensure long term asset protection in a changing climate (i.e. storm frequency, intensity, and duration). These decisions resulted in large capital cost expenditures, which help to prevent future expenditures due to stream restoration failures. This presentation highlights several construction management strategies that proved successful during this program, including: (1) sanitary sewer repair and asset protection coordination; (2) design engineer presence during the first installation of any stream restoration structure type to emphasize critical design details and ensure compliance; (3) communication and reporting mechanisms to provide both immediate/actionable feedback and record documentation; (4) scheduling tree removal site walks immediately after disturbance stakeout but prior to mobilization; (5) development of efficient construction management habits; (6) quality control of construction management reporting; and (7) flexibility to accommodate redlines due to changes in existing conditions (such as new asset exposure, complete loss of assets occurring between design and construction, unanticipated bedrock, and new stormwater pipe discharges). Time lapse photography was gathered throughout construction and will be included in the presentation. The presentation will touch on lessons learned from the design and construction phases of the project, as well as key analyses and design decisions, which allowed for successful construction.

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206 * Thursday, August 29th, 2019 * 11:00:00 AM

Garrett Stillings, DC Water

Investigating water quality and microbiological parameters related to the DC Water free chlorine disinfection period

Speaker Bio: Garrett holds degrees from Eastern Kentucky University in Environmental Studies and a Masters in Aquatic Biology. He currently serves as a Water Quality Specialist in DC Waters Water Quality and Technology department. His duties are focused on monitoring microbial influence on drinking water quality.

Abstract: To control microbial proliferation, DC Water discontinues their ammonia feed and provides a short free chlorine disinfection period (FClP). However, the success and practicality of this approach is often criticized because of the rapid reestablishment of biofilm concentrations. In addition to water quality issues, the public perception related to announcing the FClP, taste and odor complaints during and after the FClP, and increases in discolored water complaints post-FClP are challenging to overcome. In this study, we investigate the water quality, planktonic community, and established biofilm community impacts with in a single, distribution system pressure zone related to the 2018 FClP (26 Mar – 7 May). The research uses a novel analytical technique in water distribution system monitoring, flow cytometry, to quantify microbial concentrations and produce measurements for phenotypic features (i.e., nucleic acid content, morphology). Using in silico methods, we could process these phenotypic features to produce a microbial community fingerprint. By relating these communities to water quality parameters, we can understand the risk posed and the operational conditions of their growth, proliferation, and management. The overall objective of this research is to assess the FClP effects on DC Water's distribution system by analyzing both bulk water quality and established biofilms to (1) determine differences in microbial concentrations and microbial community shifts (2) determine whether the impact of the FClP on the microbial concentrations is sustained once normal operations resume, and (3) investigate geographical distribution and temporal effects of overall water quality within the pressure zone. Stratifying hydrants to reflect water age distributions within the 3H pressure zone, we sampled 15 hydrants weekly for 10 weeks bracketing the FClP and monthly thereafter to track bulk water quality metrics (i.e., free and total chlorine, free ammonia, pH, temp, nitrate, nitrite, etc) and microbial markers using flow cytometry (total and live cells, microbial community fingerprints). Two samples were collected, a low-flow, 8-min flushed sample for the planktonic microbial communities and associated bulk water quality followed by a high-velocity "scour" sample to test the microbial communities within the pipe biofilm. The combination of tracking bulk water quality parameters and microbial aspects through fingerprinting will lead to an increased understanding of the microbial diversity across the distribution system and can aid in the determination of communities responsible for a decline in water quality. Preliminary data analysis revealed that live cell counts in the bulk and scour samples statistically significantly increased within two weeks after the FClP ended and monochloramine disinfection resumed. While approximate water age was not directly correlated to increasing nitrite, more analyses are underway to understand the linkages between microbial community shifts and nitrification indicators within this study.

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201 * Thursday, August 29th, 2019 * 11:30:00 AM

Ann McPherson, Black & Veatch

Western Branch Denite Process Optimization – A Step Beyond a Business Case Evaluation

Speaker Bio: Ann McPherson holds a Bachelor's degree in civil engineering from the University of Maryland, College Park. She is a professional engineer who has worked for Black & Veatch for 7 years. She has participated in a variety of projects and has experience in wastewater collection systems, wastewater treatment, water treatment, asset management, and materials and technology evaluation.

Abstract: The Washington Suburban Sanitary Commission (WSSC) has a robust asset management program that utilizes business case evaluations to assess projects on a cost-benefit basis. This program allows WSSC to intelligently allocate capital funding across a complex and varied enterprise. The process prioritizes operable and maintainable facilities at the lowest life-cycle cost. Though more traditionally focused on decision making around individual assets, WSSC has expanded the methodology to increasingly large and multifaceted systems. This presentation will explore how even complex process decisions at one of WSSC's Water Resource Recovery Facilities (WRRF) can be better evaluated through this process to best allocate capital spending. The Western Branch WRRF is a three-stage biological treatment plant owned and operated by WSSC. The plant underwent major upgrades from 2011 to 2015 including upgrades to the first two stages: the high rate activated sludge (HRAS) system and the nitrification activated sludge (NAS) system. The denitrification activated sludge (DNAS) system is the third stage which was not included as part of the major upgrades and there are several issues regarding the operation of these facilities. The DNAS system consists of methanol addition to four denite reactors, each with multiple mixers, two stripping channels with air blowers and coarse bubble diffusers, and four final clarifiers. Business case evaluations were issued for three separate problems in the DNAS facilities: 1) the final clarifiers are 30+ years old and are in disrepair; 2) the stripping channel blowers are inefficient and require replacement and updated design; 3) there are multiple issues surrounding the stripping channels including isolation of treatment areas, uneven flow distribution between trains, and poor hydraulics. Since all three business cases are part of the DNAS system, WSSC issued all three cases together in order to evaluate and optimize the DNAS process as one integrated system. The presentation will show how the business case process was used to evaluate complex process decisions from a monetary basis to optimize the DNAS process and upgrade the facilities to enhance operability in line with the remainder of the plant.

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202 * Thursday, August 29th, 2019 * 11:30:00 AM
Morgan Brown, Water Environment Federation
Preparing for the Silver Tsunami: A Place in the Water Workforce for GED to PhD"

Speaker Bio: Morgan Brown is a Technical Programs Manager at the Water Environment Federation, within the Water Science and Engineering Center. She is the staff manager for both the Water Reuse and Municipal Resource Recovery Design committees. She also supports a number of WEF's initiatives regarding nutrients and resource recovery. Morgan has a bachelor's degree in biology and environmental sciences from the University of Virginia, and is currently pursuing a Masters in Environmental Sciences and Policy at Johns Hopkins University.

Abstract: As many in the US prepare for the deafening approach of the "silver tsunami", the water industry is not one that will be spared. According to the recently published Brookings Institute's Renewing the Water Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity, as the "silver tide" of retirements hit the water industry, it will drastically cut into the pool of skilled, qualified workers in many utilities, resulting in staffing vacancies of up to 50 percent in some cases. There is a lack of visibility and a "dirty jobs" stigma of the water sector, which only adds to the struggle to find and hold onto skilled workers, particularly those that are young and come from diverse backgrounds. However, with 212 different occupations in the water sector ranging from operators and construction workers to administrative and managerial roles, it's hard to imagine that there isn't a place for everyone with a GED to a PhD to join the path to a water industry career. In order to combat the "silver tide" and spread awareness of jobs in the water sector, member associations like the Water Environment Federation (WEF, Alexandria, VA) and the American Water Works Association (AWWA, Denver, CO) are working to develop programs that not only introduce prospective water employees to the industry, but also show that water can be a career path with many opportunities for growth. This presentation will dive into the some of the different workforce initiatives that aim to attract a young and diverse water workforce. At the introductory level, programs such as WEF InFLOW (Introducing Future Leaders to Opportunities in Water) and the Emerging Water Quality Scholars programs invite highschoola and college students to WEFTEC to learn about our industry and the many job opportunities that are available to them. There are also mentoring programs like YH2O, coordinated between the Chesapeake WEA and the City of Baltimore to recruit high school graduates into the water workforce. This presentation will highlight not only recruitment, but also training programs like the National Green Infrastructure Certification Program (NGICP), a national certification standard for green infrastructure construction, inspection, and maintenance employees. By producing and highlighting these opportunities and programs in water, we hope to attract new workers and show them that a job in the water industry is more than just a 9-5, but an enduring and fulfilling career. Who else can say that their job helps everyone, everywhere, all the time?

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203 * Thursday, August 29th, 2019 * 11:30:00 AM

Yerman Saavedra, Washington Suburban Sanitary Commission

Evaluation of Peracetic Acid as an alternative disinfectant at WSSC's Parkway WRRF

Speaker Bio: Yermam has a background in Chemical Engineering and is currently the plant Superintendent at WSSC's Parkway WRRF.

Abstract: Peracetic acid (PAA) is a disinfectant with strong oxidation potential. PAA can potentially yield short contact time requirements and rapid decomposition of its residual. Additionally, PAA provides disinfection without generating DBPs. As a result, The Washington Suburban Sanitary Commission's (WSSC) Parkway WRRF undertook an evaluation of PAA for potential implementation. The objectives of the study were: (1) Evaluate efficacy of PAA to meet effluent requirements for E. Coli (126 MPN/100 mL) (2) determine optimum PAA dose to meet E. Coli treatment goal (10 MPN / 100 mL); and (3) evaluate the impact of PAA on other water quality parameters. A pilot study was conducted using a 90-foot long reactor to simulate a contact chamber. Filter effluent was fed to the reactor prior to chlorine addition. Six sample ports simulated different Ct values through the reactor. PAA doses were varied to identify the optimal PAA dose for E. coli inactivation. Additionally, several samples were collected from the reactor discharge and held to monitor extended decay of PAA residual. Other water quality parameters measured at various collection points included hydrogen peroxide, pH, temperature, turbidity, TOC, TKN, nitrate, nitrite, ammonia, TSS, alkalinity and hardness, BOD, color, priority pollutants and whole effluent toxicity (WET). Filter effluent E. coli concentrations (prior to PAA addition) ranged from 162 to 770 MPN/100mL requiring 22.2% to 83.6% reduction to achieve the permit limit and 93.8%- 98.7% reduction to achieve the treatment goal. PAA doses less than 1.0 mg/L were adequate to meet the plant's permit limit but not the utility-driven goal at 30 minutes of contact time. However, at doses of 1.0 and 1.5 mg/L, both the permit limit and plant goal were achieved. Similar results were achieved at the higher doses evaluated. PAA residuals varied from less than 0.1 to 1.54 mg/L after a 30-minute contact time. Residuals exceeded the labelled discharge limit for PAA VigorOx limit of 1.0 mg/L at only two sampling events at high applied doses of 2.0 and 2.5 mg/L. At 60 minutes of contact time all PAA residuals were below 1 mg/L regardless of initial concentration. There was no significant change in pH between full-scale and pilot. However, the data demonstrated that PAA disinfection may require a pH adjustment strategy in order to maintain the pH above the NPDES minimum. BOD was increased in the reactor, from <2.0 mg/L (plant) to 2.7 mg/L(reactor) but remained well below the permit limit (20 mg/L). Color, TOC and turbidity were not substantially impacted by PAA. Toxicity testing was also conducted to determine effects on Pimephales promelas and Ceriodaphnia dubia. PAA dosages up to 2 mg/L indicated that survival rates were not significantly different than that of the control sample at 100 percent effluent exposure. In this presentation, a detailed summary of pilot results will be provided to establish the efficacy of PAA as a suitable alternative to chlorine. Plans for a full-scale demonstration will be presented with a discussion of anticipated system requirements and potential challenges.

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204 * Thursday, August 29th, 2019 * 11:30:00 AM

Christopher Overcash, EA Engineering, Science, and Technology, Inc., PBC

Water Treatment Intake System Investigation and Upgrade Design – Case Study: The City of Havre de Grace Water Intakes System

Speaker Bio: Mr. Overcash is a Senior Engineer with EA Engineering, Science and Technology, Inc. PBC in Hunt Valley Maryland. He is a licensed professional engineer in 7 states, a Board Certified Environmental Engineer, and is also credentialed by the Institute for Sustainable Infrastructure and the U.S. Green Building Council. He holds a Masters of Environmental Engineering from John Hopkins University where he is also an adjunct professor and an Associate of the Environment, Energy, Sustainability and Health Institute.

Abstract: Raw water intake systems in open, navigable, waterways are subject to a variety of factors which increase the initial cost as well as maintenance considerations beyond traditional upland systems. These include such items as marine construction, impacts to navigation, and protection from marine traffic or debris impacts. Generally, these systems include intake screens, piping, control valves, and pumps and associated appurtenances. When approaching the need for upgrading these systems there are also many factors to consider. These include assessing the functionality of all the current system components to establish if some of these could be cost effectively rehabilitated or reused. The design team must consider the overall objective for the system over the design time-frame and any changes to water demand anticipated over this time. Surface water quality variability must also be considered in cases where changes have occurred since the original installation was complete or are expected to occur due to factors like climate change. In addition, current regulations regarding intake velocity and screen mesh size which are in place to protect aquatic resources must also be carefully considered to meet permitting requirements. Should new system elements be anticipated for the upgrade, there can also be significant permit considerations regarding the siting in regards to environmental impacts and cultural resources. One such system is operated by the City of Havre de Grace, Maryland. The City of Havre de Grace Water Treatment Plant intakes are located within the Susquehanna River at the confluence with the northern Chesapeake Bay just offshore from the city. This system includes 3 existing intake pipes; one in shallow water near shore and 2 in deeper water approximately 1,200 feet offshore. This system had been in operation for nearly 40 years and, based on current regulatory requirements of Maryland Department of the Environment and the Maryland Department of Natural Resources of an intake water velocity of less than 0.5 feet per second and a mesh size not to exceed 1 millimeter, an upgrade of the intake system was planned. This upgrade plan first involved a detailed inspection including a certified engineering dive team site visit to characterize the screen condition and functionality. Next, a multibeam hydrographic survey of the intake pipe and screen locations was completed to identify debris in the project area, abandoned pipes and other considerations which could be used for the system upgrade design. In addition, a review of the pump configuration and control valves was conducted to assess the current water intake and the system condition. With this information the design team could start the process for completion of the system upgrade design to include new intake screens and one pipe.

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205 * Thursday, August 29th, 2019 * 11:30:00 AM

Hisham Wahdan, Arlington County

Relining the Four Mile Run Relief Sewer Line: Construction Management Challenges

Speaker Bio: Hisham Wahdan has been a Construction Manager with Arlington County for over five years. He specializes in overseeing all sewer maintenance and preventative work completed by contractors. He's is PACP and MACP NASSCO Certified, and holds a Bachelors Degree in Civil Engineering.

Abstract: Arlington County is located in Northern Virginia on the southwestern bank of the Potomac River directly across Washington D.C. With a land area of 26 square miles and a population of approximately 230,000 people, it is the geographically smallest self-governing county in the United States. Arlington County's sanitary sewer is comprised of approximately 470 miles of mains, and about 14 miles of sanitary sewer are relined each year. The Four Mile Run Relief Sewer Line is a 60-year-old 48-inch and 54-inch concrete sanitary relief interceptor. It runs along South Glebe Road, a 4-lane primary state highway on one side, and the Four Mile Run River on the other side. It is one of the main sanitary sewer lines flowing in to the Water Pollution Control Plant. The condition of the relief sewer was assessed with a sonar/CCTV inspection, and enough defects were found to warrant a rehabilitation project. This project consisted in CIPP lining 3,000 feet of 54-inch, and 2,600 feet of 48-inch sewer line. The temporary bypass system for this project included five 10-inch pumps discharging to a 24-inch HDPE pipe. The bypass line length was 1.4 miles, and crossed a bridge, a bike trail in several locations, Arlington County Park property, private property, and eventually discharged at the Arlington County Water Pollution Control Plant. This project also included a concurrent sanitary repair work which replaced about 20 linear feet of the 54-inch sewer pipe and installed a junction box while using the same bypass system. This presentation will focus on the construction management aspect of the project, including complex construction and coordination challenges, permitting requirements, public outreach, pedestrian/cyclists' management, and unforeseen conditions.

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206 * Thursday, August 29th, 2019 * 11:30:00 AM

Dinesh Bahadursingh, Washington Suburban Sanitary Commission

Simultaneous Manganese Control and DBP Treatment Strategy at WSSC's Potomac Water Filtration Plant

Speaker Bio: Dinesh Bahadursingh is currently the Section Manager for Plant Engineering at the Potomac Water Filtration Plant. He started with WSSC as a water plant operator with the Patuxent Water Filtration Plant in 2007. He has BS in Mathematics from the University of Maryland.

Abstract: The Potomac Water Filtration Plant supplies water to 70% of WSSC's customers on average and has the capability to supply the entire system. When not controlled, manganese (Mn) in the raw water can lead to discolored water when oxidized by chlorine in the distribution system. The plant uses a combination of potassium permanganate preoxidation and pre-filter chlorine to oxidize Mn on the filter media before it reaches the distribution system. The DBP control strategy is seasonal low pH enhanced coagulation, with a switch from PACl to a ferric coagulant when even greater organic removal is called for. There are several disadvantages to this strategy. The addition of chlorine prior to filtration promotes disinfection byproduct (DBP) formation. Further, during wet weather events, the river presents increased chlorine demand, at precisely the time chlorine is needed to control the increase in raw water Mn. Yet the Plant must remove Mn while meeting DBP limits. These competing treatment goals raise questions like: Can we feed more chlorine to the filters? When is ferric coagulation needed? Will we meet the DBP limits? WSSC recognized the need to approach the problem more proactively. This strategy included on-line monitoring of organic compounds (precursors to DBPs) using monitors already built into the UV disinfection system, regular optimization of potassium permanganate dosing, and the trial of ferric sulfate to avoid additional manganese input from ferric chloride. This presentation will discuss the efforts undertaken to implement this strategy and to provide the tools and real-time data for operational control.

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201 * Thursday, August 29th, 2019 * 12:00:00 PM

Adolfo Carpio, Washington Suburban Sanitary Commission

Optimization of WSSC's Water Main Replacement Program

Speaker Bio: Adolfo "Fito" Carpio is a Project Manager in the Asset Management Office (AMO) within WSSC. Fito is a Civil Engineer from National University of Engineering (UNI) in Peru and has 16 years of experience. He holds a PE license from Maryland and a PMP Certification from PMI. Besides managing business cases in AMO, he provides support to the implementation of the Asset Management Program by managing multiple projects. Recent projects Fito has been involved include: - Water Main Replacement Program Optimization business case - Western Branch WRRF Denitrification Upgrades business case

Abstract: Washington Suburban Sanitary Commission (WSSC) provides water and wastewater services to approximately 1.8 million residents in the Montgomery and Prince George's counties in the Metropolitan Washington area. WSSC maintains approximately 5,700 miles of water mains ranging in size from 3 to 96-inches in diameter, with portions of the water distribution system more than 80 years old. WSSC has a Water Reconstruction Program designed to renew and extend the service life of its water distribution system. For the prioritization of water main replacements, WSSC follows an asset management approach to assign priority scores to each pipe, considering level of service requirements and business risk exposure. The focus of this presentation is on process improvements and optimization of how the high priority water mains (<16-inches) are grouped into project packages. WSSC has undertaken a business case evaluation of its water main replacement selection process with a goal to increase its efficiency while identifying an optimal balance between targeted replacement and community based replacement. This evaluation will allow WSSC to assess the costs and benefits of alternative strategies to group and package water mains into replacement projects. The process is supported by a custom optimization tool which allows definition of optimized projects considering construction cost, water main remaining value, selection efficiency, spatial efficiency, community impacts while satisfying numerous constraints.

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202 * Thursday, August 29th, 2019 * 12:00:00 PM
Steve Bian, DC Water and Sewer Authority
Pipeline Resiliency to survive L.I.D – an endurance test by design?

Speaker Bio: Steve Bian, Supervisor of civil and structural design Mark Babbitt, Manager of developer review Brian McDermott, Director of Permitting Operation

Abstract: As recently quoted from the EPA, Low-Impact Development (LID) is an approach to land development/re-development that works with nature to manage stormwater as close as possible to its source. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product. Bioretention facilities, rain gardens, vegetated rooftops, rain barrels and permeable pavements are some examples of this design philosophy. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. The matrix of buried wet utilities built since the 1800's has been engineered to modify natures free-flowing hydrology to contain storms into an impervious collection system to stop the ground scouring effect on the natural landscape, flooding and outbreaks of disease. These collection systems, working in tandem with the distribution system, enables the construction and expansion of urban development. Until recently, the pipeline industry increasingly relies on the proven practice of consolidating its bedding, especially the haunch area as the circular shape vessel depends on the soil layers for its structural and hydraulic lifetime performance. Restoring the watershed in a zone with buried pipeline will likely challenge all in-situ pipelines and will require enhanced design guidance for erosion resistance in future pipeline design. Collaboration will be a necessity among pipeline management and green infrastructure development professionals to avoid such an "endurance test".This presentation will try to benchmark with the industry on the sustainability of pipelines both in-situ and new if in the same zone as green infrastructure.

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203 * Thursday, August 29th, 2019 * 12:00:00 PM

Laura Marcolini, Laura Marcolini & Associates, Inc.

Consistent Compliance with Low Level Nutrient Limitations, Extreme Flow and Load Variation Using a Small System Membrane Bioreactor

Speaker Bio: Laura holds a BS in chemical engineering and an MS in environmental engineering and has over 25 years of experience in wastewater process design for municipal and industrial treatment facilities. Laura has been responsible for biological process designs of innovative or high-rate fixed film and activated sludge processes including membrane bioreactors since the early 1990's. She is an active member of WEF, NEWEA, Narragansett WPCA and is co-author of WEF's MOP 8, Design of Water Resource Recovery Facilities, 6th Edition), August 2016-2017.

Abstract: In the case of large municipal wastewater treatment plants (WWTPs), flow and load variations are typically diurnal; however, fluctuation in wastewater generation by schools, rest stops, retail complexes, and even shared residential systems are extreme, and periods of minimum and maximum loading can last longer than treatment system bacterial growth and decay cycles. These extremes cause tremendous challenges for process control and stability, as they cause biological stress and make it difficult, if not impossible, for operators to achieve consistent regulatory discharge compliance. Small wastewater systems typically include septic tanks for primary suspended solids removal; however, some degree of degradation of biochemical oxygen demand (BOD) and nutrient (ammonia-nitrogen and phosphate-phosphorous) release is also achieved. The paper and oral presentation will provide details regarding the installation, at least two (2) years of operating data from the Gerstell Academy wastewater treatment process, and a discussion related to the system's ability to maintain consistent compliance, attributed to turndown capacity and dynamic control. In Spring 2017, Innovative Treatment Products (ITP) delivered its miniMBR® Advanced Membrane Bio-Reactor Package Plant with ENR and Water Reuse Capability, which was set in place pre-wired, pre-piped and pre-tested for final connections on a single day. Within two weeks of delivery, the complete system was operational and commissioned for startup. The design criteria for the miniMBR® process is based upon influent containing flow and pollutant loads with high nitrogen to carbon ratio in the influent, typical of septic tank effluent. Membrane bioreactors (MBRs) have proven better-suited for treatment of small system waste streams, but challenges associated with turndown and control must be considered. Comparative advantages with respect to traditional treatment techniques include smaller footprint, high loading rate capabilities, modularity and disinfected/highly clarified effluent immediately suitable for reuse (Boguniewicz-Zablocka and Capodaglio, 2017). The ITP system is built into a vacuum infused, close-molded monolithic fiberglass reinforced plastic (FRP) structure. Sanitary wastewater is collected in underground infrastructure (septic and equalization tanks), then screened and processed by the miniMBR® Package Plant. The 0.03 micron tubular ultrafiltration (UF) membranes and ancillary MBR process equipment including pre-screening and grit removal, blowers, control valves, pumps, instruments and controls are skid mounted so operators do not have to routinely access biological process basins. Skid mounted equipment is designed for easy maintenance with standard tools and equipped with quick disconnects, which allows the operations staff to safely disconnect devices for calibration, repair or replacement without lock-out tag-out issues and without taking the system offline. Remote access allows operator control when onsite presence is not required, for example to change process set points. A unique hydraulic flow and air scour system affords extremely low energy consumption and minimal dissolved oxygen carry-over to the biological process.

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204 * Thursday, August 29th, 2019 * 12:00:00 PM

Josh Weiss, Hazen and Sawyer

Modeling Framework to Support Water Resource Appropriations and Dam Operations

Speaker Bio: Josh Weiss is Hazen and Sawyer's Director of Water Resources Innovations. He holds a BS in Civil Engineering from Georgia Tech; MS and PhD degrees in Environmental Engineering from Johns Hopkins University; and is a Diplomate, Water Resources Engineer. Dr. Weiss specializes in water resources planning, source water quality, modeling, hydrology, climate change, and applications of forecasts for water resources management. He works with water utility operations staff and managers to integrate the latest data and tools into their decision-making toolboxes.

Abstract: The City of Hagerstown, Maryland, manages two water supply sources, an intake on the Potomac River and the Edgemont Reservoir, to meet roughly 11 mgd of average demand for more than 89,000 customers. To ensure a long-term, reliable, and robust water supply system, the City and Hazen and Sawyer are conducting a water supply reliability and vulnerability analysis. We are applying an innovative modeling framework to explore dynamic and adaptable withdrawal strategies that optimize system operations under both normal and stress conditions. This framework will establish the basis for dynamic and adaptable source appropriations that ensure protection of environmental resources while maximizing the City's water supply reliability. At the core of this framework is the Interstate Commission on the Potomac River Basin's (ICPRB's) OASIS system model (HydroLogics, Columbia, MD). OASIS is a mass balance water supply system model that allows users to evaluate alternative operational and infrastructure scenarios under a wide range of hydrologic conditions, typically derived from the historical hydrologic record. For this evaluation, the ICPRB OASIS model was updated to include the Hagerstown water supply system and operating rules for withdrawals from the two sources. Initial simulations focused on evaluating the maximum constant withdrawal that could be supported by the inflow to Edgemont Reservoir. Further simulations were used to explore maximum withdrawals that could be supported for a short period of time (1 week to 1 month) as a function of baseline withdrawal, time of year, and starting storage. From these simulations, a set of operating rules is being developed that seek to optimize usage of the City's two supply sources while maintaining a desired level of storage in case of drought or infrastructure outage. Model simulations will be used to test and refine these rules until desired performance is achieved, expressed by key performance indicators (KPIs). In this presentation, we will describe how dynamic system operations are becoming increasingly common in water resources management. We will use results from modeling the Hagerstown water supply system to show how they can help water supply managers better balance water supply and environmental objectives. Finally, a generalized modeling framework will be proposed for future water supply appropriations that is more robust and flexible than the traditional safe yield approach.

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205 * Thursday, August 29th, 2019 * 12:00:00 PM

Robert Geist, GHD

Keeping it Clean - Hydraulic Advantages of Self-Cleaning Trench Style Sewage Pumping Stations

Speaker Bio: Robert has 26 years of experience in management, design, and construction of water, wastewater, and infrastructure projects. His experience includes both large and small pumping stations, multi-disciplinary facility projects, sewer collection and water distribution projects, and design-build projects. His specialty includes pump station design and hydraulic analysis.

Abstract: Conventional rectangular wet wells have been used for decades at sewage pumping stations but are susceptible to accumulation of solids, scum, and debris. An alternative wet well configuration that is gaining broader acceptance and use is the self-cleaning trench style wet well design. Self-cleaning trench style wet wells allow for routine cleaning of the wet well by utilizing the installed pumping equipment, thereby reducing the need for more expensive manual cleaning methods. This paper describes the design approach used for one of the first self-cleaning trench style wet well pumping stations to be constructed in Maryland. The pumping station is designed to convey wastewater collected from unincorporated areas north and east of the City of Frederick to the County's 15.0 mgd Ballenger-McKinney Wastewater Treatment Plant on the south side of the city without passing through the City of Frederick's sewage collection system. The Monocacy Sewage pumping station incorporates a self-cleaning trench style wet well with dry-pit submersible pumps. The new pumping station is designed for a future firm capacity of 20.0 mgd, but only three of four planned pumps are being installed now, providing an initial firm capacity of 12.0 mgd. The wet well design is based on ANSI/Hydraulic Institute (HI) standard 9.8-2012 and the pumps are installed in a 50 ft long by 5.5 ft wide trench, with an ogee ramp transition connecting the influent sewer to the trench. During a cleaning cycle, the ogee ramp coverts potential energy into kinetic energy and allows a hydraulic jump to be formed re-suspending solids and grease. The hydraulic jump propagates through the trench to the last pump, allowing re-suspended matter to be pumped out of the wet well. This presentation will compare the design of a self-cleaning trench style wet well with a conventional wet well, and outline the key advantages and disadvantages associated with both designs. The self-cleaning trench style wet well cleaning procedure will be reviewed, to show how the pumps can be used to remove solids, scum and debris from the wet well and reduce the frequency of manual cleaning operations. The $14 Million pumping station is expected to be completed in 2019.

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206 * Thursday, August 29th, 2019 * 12:00:00 PM

PJ Crow, OBG, Part of Ramboll

Comprehensive Piloting of Innovative Process Combinations to Control Disinfection By-Products and Manganese

Speaker Bio: PJ has more 7 years of experience as an engineer with OBG, Part of Ramboll. He is a graduate of Syracuse University and generally works on water treatment and sanitary sewer rehabilitation projects, in addition to water system hydraulic modeling.

Abstract: The 144 MGD Philip J. Holton Water Purification Plant (WPP), the largest surface water treatment plant in New England, is now over 90 years old. While it generally provides high quality finished water, there are some locations in the distribution system that approach the MCL for trihalomethanes (THMs). Raw water quality is very good, but there are seasonal manganese levels of approximately 0.5 mg/L that require treatment to maintain a goal of 0.15 mg/l. Complicating the treatment strategy is the fact that the water system has challenges meeting the Action Level for lead, and currently is under consent order. A comprehensive year-long pilot study was performed to address: lowering organics/DBPs, maintaining control of seasonally high manganese levels, rehabilitating an aging treatment plant, and all of the above in concert with a long-term strategy for control of lead corrosion. After the initial screening of potential treatment processes, bench tests were performed to pre-screen process options and select initial chemical dosages. The study included the operation of a baseline process train representing current treatment, plus four pilot process trains, allowing direct comparisons of treatment performance of each process under all four seasons of raw water quality conditions. Pilot processes included the first ever pairing of magnetic ion exchange (MIEX TM) resins with direct filtration, advanced oxidants (ozone and chlorine dioxide), high rate clarification (dissolved air flotation and lamella plate settlers), activated carbon (powdered and granular), with conventional and biologically active filters. This presentation will describe the pilot findings, several of which expand the current knowledge base with instances of both success and challenges for the piloted process trains.

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201 * Thursday, August 29th, 2019 * 2:00:00 PM
Sonia Oton, Mott MacDonald
Budget vs Needs – The Secret of Pipeline Renewal Defect Prioritization

Speaker Bio: Ms. Oton has 18 years of experience in the water and wastewater industry. She has planned and designed rehabilitation of water mains, collection systems, and upgrades to water and wastewater treatment facilities. Ms. Oton is a Senior Associate at Mott MacDonald and is part of the DC Water's Water Program Management Team.

Abstract: Have you ever been tasked to manage an aging infrastructure while a multitude of assets are in need to be fixed, yet there is limited budget to do so much? The needs are abundant while the budget could be scarce. Asset Management allows the utilities to systematically manage their infrastructure and assets during their life cycles to deliver an agreed standard of service. DC Water has a robust Pipeline Condition Assessment (PCA) Program developed under the Asset Management framework. As part of the PCA Program, DC Water is systematically inspecting large diameter water mains (≥16-inches), determining remaining service life, renewal needs, and probability of failure. But how all these can be integrated so the assets can be properly managed, prioritized and budgeted in the capital improvement program? DC Water is currently commissioning an asset management risk prioritization tool that ranks and prioritizes the linear assets. In the process of customizing this tool to meet DC Water's needs, a scoring system was developed to rank and prioritize the renewal of large diameter water mains based on PCA results. Although this may sound a straight forward task, the prioritization of pipelines with different diameter, material, location and defects is not. The scoring system allows the authority to place each pipeline in a "cart" based on the PCA results, such as, leakage, pipe wall loss, remaining and useful life in the case of metallic pipes, and electromagnetic results for PCCP pipes. The cart system groups the linear assets based on their condition ranging from cart 1 (Very Good) to cart 5 (Very Poor). In short, the secret of a well-run pipeline renewal program lies on the understanding and management of the pipeline defects. This presentation will include: (1) DC Water's approach to rank and prioritize large diameter water main renewal needs based on PCA results, (2) the criteria to develop the rank "carts", and (3) examples on how the scoring criteria can help prioritize capital improvement projects.

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202 * Thursday, August 29th, 2019 * 2:00:00 PM
Paul Delphos, AECOM
Get Ready to Rumble!! Alternative Delivery Panel Discussion from Three Different Perspectives

Speaker Bio: Mr. Delphos is the Water Treatment Manager for AECOM's Southeast Region with a Bachelor's and Master's from Georgia Tech. He is DBIA-certified and has 25 years of experience in the water and wastewater industry, including a number of alternative delivery projects. His technology focus is in the area of membrane treatment and advanced drinking water technologies and he is the Deputy Program Manager for the HRSD SWIFT program which involves over 100 MGD of new, advanced water treatment plants, all of which will be delivered under an alternative delivery model.

Abstract: Alternative delivery methods for water and wastewater projects are becoming more and more common throughout our industry. While some agencies have a long history of alternative delivery projects, others a just starting to consider non-traditional delivery approaches. As with anything new, especially something as critical as project delivery, garnering the perspectives of individuals and agencies who have been previously engaged in similar types of projects can prove to be exceptionally beneficial. One of the most critical success factors for alternative delivery projects is the trust and teamwork developed between Owner, Contractor, and Engineer. The most successful alternatively delivery projects occur when the parties are in alignment and utilize Design-Build Institute of America Best Practices throughout the course of the project. To this end, this presentation will incorporate a panel discussion comprised of an Owner, Contractor and Engineer who have each been involved with multiple alternative delivery projects in the water and wastewater industry. A moderator will ask questions (as well as solicit questions from attendees) of each participant as to their perspective of alternative delivery including the advantages, disadvantages, lessons learned, suggestions for others, favorite components, etc. What will result will be an engaging discussion between participants as well as presentation/panel discussion attendees. As such, attendees will hear multiple perspectives of the alternative delivery approach for water and wastewater projects and will garner insight into how to alternative delivery projects work and how best to maximize the benefits of non-traditional project delivery approaches. In the past, panel discussions have not been commonly used at TriCon; however, it is proposed that using a focus group to discuss alternative delivery team relationships will provide a broader range of viewpoints to conference attendees.

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203 * Thursday, August 29th, 2019 * 2:00:00 PM

John Revette, Wendel

What are my options when I need a Solids System Upgrade focused on Maximizing Biogas Production and Use?

Speaker Bio: John Revette, PE, has more than 14 years of experience in water and wastewater engineering. His areas of expertise include planning, evaluation, design, and construction administration of municipal water and wastewater projects with a specific focus on enhanced nutrient removal for wastewater facilities. John has a B.S. from Clarkson University and an M.S. in Environmental Engineering from Johns Hopkins University, and is a registered professional engineer in Virginia. He is also an active member of the Water Environment Federation.

Abstract: "Replace in kind" is becoming an approach of the past. Wastewater treatment plant operators are faced with more stringent regulatory requirements, solids disposal costs, limited budgets, and sustainability expectations. So when it comes to improvements projects, what new tools can the operators use to develop a capital improvements project? An integrated capital and energy approach to improvements can help facility managers look holistically at their options. We will discuss a case study of the Village of Endicott Wastewater Treatment Plant Upgrade. Through the preliminary design evaluation, it was determined that the best course of action was to abandon the existing in-vessel composting system and replace with a Biosolids drying system. The drying system will utilize excess biogas to reduce reliance on natural gas and maximize the use of biogas. For this program, we evaluated opportunities to increase revenues associated with septage hauling and maximize the production and use of biogas from the anaerobic digester system. The plant will optimize the use of its existing infrastructure, rehabilitate existing digesters to maximize biogas, increase revenue and continue to produce a class Biosolids for beneficial reuse through drying. The project includes the following design components: Digester Mixing System Replacement, Biogas Storage System, Digester Cover Replacement, Biosolids Drying System (utilizing excess Biogas), Septage Receiving Station, Plant Water System

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204 * Thursday, August 29th, 2019 * 2:00:00 PM
Christopher Garrett, Brown and Caldwell
Trenchless Success Story for Water Main Rehabilitation

Speaker Bio: Chris Garrett is co-leader of Brown and Caldwell's national Aging Infrastructure initiative, promoting advanced condition assessment technologies, criticality based decision making and rehabilitation design. Mr. Garrett is excited to be involved in the buried infrastructure industry at this time where innovation, predictive analytics and advancements in rehabilitation technologies are working in concert to extend asset life and improve water service.

Abstract: Though trenchless rehabilitation technologies have been successfully demonstrated for wastewater infrastructure, its adoption has been muted by Water Utilities for a variety of reasons: - Lack of reliable condition assessment information to make informed decisions - Comfort level with and cost of available technologies for structural renewal compared to open cut replacement - Logistical and water quality concerns related to temporary water service operations required for trenchless rehabilitation Greenville Utilities Commission (GUC); Greenville, North Carolina recently completed its first water main trenchless rehabilitation project using a structural rehabilitation solution. The project was the culmination of desktop planning and criticality prioritization of its water distribution system that has assets over 100 years old. The evolution of the pipe materials and construction mirrored the economic cycles of this City in the 20th and 21st centuries. Acknowledging that approximately 20 miles (3%) of its system was prioritized as high criticality assets for renewal with a replacement value of approximately $18M, GUC implemented a trenchless demonstration project for renewal as an alternative to open cut replacement. This presentation documents the decision-making process for the first construction phase of a 10- year CIP developed to address the highest criticality assets. Beyond highlighting the construction project, the presentation summarizes the evaluation of appropriate trenchless technologies considered during design per the AWWA M-38 standard (including CIPP); and how the State Drinking Water Loan program reporting requirements affected the program. Finally, the lessons learned from the bidding and construction of the project will be presented that include, but limited to the following: - Field verification of valve condition and sizing as part of the design process – Exercising valves and counting turns to open and close would have verified presumed pipe sizes and valve conditions, as water main pipe size variations were not reflected on record drawings. - Prescriptive chlorination plans beyond the AWWA C651-14 performance standard – Every meter, access pit and dead end of the system removed from normal service during construction needed to be tested. - Prescriptive temporary water service requirements for high consequence customers with water quality and/or fire flow service requirements that could not be altered during the project. - Project phasing requirements from high consequence customers must be balanced against the realities of project execution – especially for mobilization requirements for temporary water service and specialty contractors. - For older piping, be prepared for confirming live connections – one reach had 31 connections with just four active services. - Opportunistic evaluation of piping excavated and/or inspected for consideration in the asset management prioritization.

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205 * Thursday, August 29th, 2019 * 2:00:00 PM

Ben Asavakarin, Johnson, Mirmiran & Thompson

Protecting the Susquehanna River: Upgrades to the Front Street Pumping Station

Speaker Bio: Ben Asavakarin, P.E. is a Vice President at JMT, for which he is responsible for leading design improvement and replacement projects at treatment plants and pumping stations. He holds a bachelor's in civil engineering from the University of Maryland at College Park and a master's in environmental engineering from Georgia Tech. Ben has more than 20 years of experience in the areas of water and wastewater process engineering, sanitary sewer evaluation survey (SSES), hydraulic modeling, and instrumentation and process controls design.

Abstract: About 60 percent of the City of Harrisburg's sewer pipes are part of a combined sewer system. During wet weather events, stormwater flows exceed capacity, causing a mixture of sewage and stormwater to overflow into the Susquehanna River or Paxton Creek. Capital Region Water (CRW) owns and operates the sewer collection, conveyance and treatment facilities serving the City of Harrisburg. In 2015, CRW entered into a partial consent decree requiring the utility to develop a plan to reduce runoff pollution entering Paxton Creek and the Susquehanna River. As part of the broad reaching plan to reduce the combined sewer overflows (CSOs), CRW initiated design upgrades to the Front Street Pumping Station (FSPS), which serves as the heart of the conveyance system and handles more than 60% of the wastewater flows for the City of Harrisburg. The improvements will increase station capacity by more than 30% to handle a peak wet weather flow of 60 MGD. To ensure adequate capacity sizing, JMT developed station hydraulic modeling and worked closely with CRW's Wet Weather Program Consultant to evaluate predicted wet weather flows. The majority of the process mechanical systems equipment in the station is original and dates back to the late 1950s. To increase station capacity and improve station reliability, it is necessary to replace a majority of the station process equipment system. The rehabilitation of the FSPS includes installation of new multi-rake screening, screening conveyance, and screenings compaction. Due to the critical nature of the screening system to station operation, the screening system equipment was pre-selected. Project also includes installation of four 20 MGD, centrifugal pumps with VFDs, complete replacement of the pump suction and discharge piping systems, complete upgrade to the existing power supply and distribution system, improvements to the building HVAC system improvements to meet code requirements, including NFPA 820, and installation of a vegetative (green) roof. To maintain station operation during construction, the design includes provision of complete station bypass system, consisting of 60 MGD of temporary bypass pumping system and associated linestops and pipe taps. The presentation will discuss the development of flow criteria for pump selection, the development of the station hydraulic model, development and implementation of the first equipment pre-selection for CRW, evaluation of reasonable construction lay down area when space is restricted, and the exhaustive alternatives evaluation for design of the station bypass pumping system. The presentation will be useful to utilities and operators considering improvements to existing pumping station to increase capacity. The presentation will provide a summary of lessons learned, with focus on the necessary close coordination to balance efficient pump selection with wet weather capacity needs.

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206 * Thursday, August 29th, 2019 * 2:00:00 PM

Kelsey Kenel, HDR

When Algaecides can't cut it: Algae Treatment by Air and Sonication

Speaker Bio: Kelsey is a water/wastewater EIT at HDR in their Vienna office in Northern VA. She has been with HDR for 2.5 years and focuses on a variety of smaller drinking water, wastewater and reclaimed water projects. She has done multiple projects studying algae speciation in drinking water reservoirs and has looked into different types of treatment methods. Before HDR, Kelsey went to the University of Maryland for her bachelors and masters degrees in Environmental Engineering.

Abstract: Algae growth in drinking water treatment reservoirs can significantly impact water quality and potentially cause taste and odor (T&O) issues depending on the presence and species of the algae. Additionally in some cases, harmful algal blooms (HABs) can release cyanotoxins into the water supply that can be dangerous to pets, wildlife, human consumption, and can cause water quality issues. Other aquatic species such as diatoms can prematurely clog filters, reduce filter run times, and overall productivity. Due to the adverse impacts from HABs, water treatment utilities may look for control methods to minimize problems caused by algae growth in both reservoirs and water treatment plants. The City of Manassas (the City) owns and operates the Lake Manassas Water Treatment Plant (WTP) in Manassas, VA and treats water received from the raw water intake dam at the Lake Manassas reservoir. The reservoir has seasonal algae growth that impacts the WTP mainly through filter clogging and subsequent increased filter backwashing. Due to the cyanobacteria and diatom algae species present, there is a chance for T&O issues to arise in the finished water. The City currently uses a commonly recommended copper sulfate pentahydrate algaecide, however the anticipated removal results have not been observed with this treatment. HDR worked with the City to evaluate seasonal trends in the species and algae counts present, water quality impacts, and potential algae treatment technologies beyond commonly used chemical algaecides, including physical and acoustic methods. A detailed analysis of existing algae count data throughout the reservoir and each intake gate in the Lake Manassas Dam was completed and evaluated for trends with water quality parameters including nutrients, turbidity, temperature, free carbon dioxide, and pH. It was seen that the algae counts increased during transition months (spring, fall) and that when higher algae counts were present, there were higher levels of turbidity and pH, but a decrease in levels of free carbon dioxide, indicating an increase in photosynthesis. The water quality analysis assisted in targeting the optimal conditions for algae growth in the Lake and the annual timeframe for growth. Various treatment options were evaluated with a specific focus on aeration and sonication technologies. HDR worked with the City and manufacturers to evaluate these technologies specifically for Lake Manassas. The evaluation included the bathymetry of the Lake, water quality data, and water treatment needs. It was recommended to the City to try a different chemical algaecide and consider conducting a pilot sonication study with one buoy system to determine if it is a feasible method before installing a full scale system. This presentation will provide an overview of algae speciation, specific algae speciation in Lake Manassas and correlations with water quality trends, and an overview of algae removal methods, with a focus on aeration and sonication.

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201 * Thursday, August 29th, 2019 * 2:30:00 PM

Andrew Casolini Dal Bo, Wendel

What Goes Down, Must Get Pumped Back Up - How Pump Station Asset Evaluation Helps to Optimize Performance and Pay for Capital Improvements

Speaker Bio: As head of Wendel's Water and Wastewater Infrastructure Group, Mr. Casolini provides technical expertise and project management for water related projects. Andrew has a strong focus on asset management and strategic planning for water and wastewater systems, in particular the design and retrofitting of facilities. An expert in the collection, distribution, and treatment of water, wastewater, and storm water, Andrew has led infrastructure improvement projects for urban and rural communities with facility capacities ranging from 3,000 to over 100 million gallons per day.

Abstract: Collection system assets, specifically pump stations, are critically important to wastewater systems. If that is the case, why do we often spend so much time and money understanding the operation of the systems "inside the fence" (treatment plant) assets while we treat many "outside the fence" assets, (namely pump stations) as lesser systems? This presentation will identify some of the emerging trends in pump station asset evaluation. The monitoring and continued analysis of "outside the fence" assets is necessary for Owners to better understand their pump station operation, find ways to improve operational efficiency and reduce costs. The presentation will provide information for Owners to consider, information considered to be "Key Performance Indicators" (KPIs) and how to best use information to understand their energy consumption for collection system assets. By understanding the asset operation and performance, the Owners can then make real time decisions about performance, maintenance, and how it impacts their system operation. The asset management information can also be used to help make longer term decisions about the best ways to integrate energy savings into future capital investments. This presentation will look at ways asset data can be used for Integrated Capital and Energy (ICE) planning of the assets. A number of implemented ICE pumping station studies and projects will be reviewed including an energy management study with the City of Phoenix Water Services Department, energy efficiency upgrade for Shawnee Road Pump Station with the Niagara County Water District, a Magna-drive installation at the Town of Amherst and an energy/operational efficiency master plan with the Onondaga County Department of Water Environment Protection. Each of these analyzing how energy efficiency and process optimization opportunities can be identified and integrated into capital planning to facilitate needed repairs and control on-going operating costs.

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202 * Thursday, August 29th, 2019 * 2:30:00 PM
Brianne Nakamura, Water Environment Federation
The Smart Start: Workforce Gaps in Intelligent Water Systems

Speaker Bio: Bri is a Senior Manager in WEF's Water Science and Engineering Center. At WEF she primarily works with the technical committee's including the Collection Systems Committee, Industrial Wastewater Committee and the various task force's and also manages the WEFTEC Innovation Pavilion Programming. Prior to WEF, Bri worked for an engineering consulting firm in the DC metro area; mainly focusing on municipal wastewater projects. She holds a BS in Civil Engineering from Syracuse University and is a registered professional engineer in the District of Columbia.

Abstract: As wastewater utilities begin to adopt intelligent water systems into their programs, many are struggling to find the workforce needed to run these new systems. Is it an engineer, who knows some information technology (IT)? Or is it an IT specialist with some understanding of engineering and water processes? It is a continual struggle for utilities who need to define their information and operational needs (IT v. OT). Also with the introduction of intelligent technology comes a need for staff to have a whole new skillset and vocabulary. In April 2018, WEF participated in the annual Water and Wastewater CIO Forum. During the forum, many participants brought up both the struggles and successes of finding staff to develop and operate the newer intelligent water systems. Like any new implementation, staffing is never a one size fits all situation, with different utility structures and needs, the staff needed will differ for every utility. This presentation will address the different workforce issues utilities are facing from hiring for changing positions in information and operational technology, training existing staff, staff turnover and adaptation, and the roles of millennials. The presentation will also include first hand experiences and observations from those in the information technology, utility management, and operations departments.

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203 * Thursday, August 29th, 2019 * 2:30:00 PM
Kacey King-McRae, Alexandria Renew Enterprises
Optimizing Plant Performance with "Smart" Operations

Speaker Bio: Kacey King-McRae is the Process Analyst at Alexandria Renew Enterprises Water Reclamation Plant in Alexandria, VA. She is a Virginia Class 1 licensed plant operator, with a Bachelor's Degree in Chemistry. She has worked at Alexandria Renew in the production department for the past four years and is currently the probe maintenance team manager.

Abstract: The future operation of water resource recovery facilities relies heavily on process monitoring instruments and fully automatized process controls. In 2015, Alexandria Renew Enterprises (AlexRenew) successfully implemented a sidestream deammonification process and is now transitioning to the first full-scale mainstream anammox process in the US. These processes are fully automated and equipped with a significant amount of process sensors. Sensor reliability is crucial to these self-regulated processes. This presentation will summarize the control strategies used in the facility. The sidestream treatment process uses pH-based control. The mainstream treatment process includes ammonia-based aeration control (ABAC), air ON/OFF operation and automated methanol dosing. The impacts of these control methods on resource consumption (aeration demand reduced by 20% and methanol use reduced by 50% to-date) will be presented. The presentation will also offer an "operator's perspective" on the importance of regular probe maintenance and how AlexRenew implemented their interdisciplinary program to keep these crucial instruments operating properly to enable accurate controls.

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204 * Thursday, August 29th, 2019 * 2:30:00 PM

James Parkes, Schnabel Engineering

Considerations for Tunneling Water Conduits through Rock Formations

Speaker Bio: James Parkes is the Technical Tunneling Director with Schnabel Engineering's Tunneling Services Group. He graduated summa cum laude with BS and MS degrees in civil engineering from Virginia Tech. He has 20 years of experience in the geotechnical and tunnel design for underground works. His experience includes tunnels, shafts, and trenchless installations for water, wastewater, drainage, and transit facilities.

Abstract: Many new water system projects include pipelines that must be installed through hard rock formations. Examples include intake pipelines and well shafts for pumped storage facilities, raw water intake pipelines, sewers, and pipelines for transmission and distribution facilities. These water lines must often be tunneled through hard rock formations because of existing surface features, such as roadways or bodies of water, or due to site topography. However, tunnels for pipelines through rock involve a number of constructability issues that should be considered in the design phase. Many of these pipelines are too small to be effectively tunneled through rock at the planned pipeline diameter, so the design must consider tunnels or shafts that may be significantly larger than the pipe to be installed. Constructability considerations may also influence the design of the pipeline or system alignment or configuration, such constraints on tunnel line and grade or shaft alignment. Such considerations should be considered in the early stages of a project in order to develop the most feasible and cost effective design as well as to ensure appropriate cost estimates are developed through the design process. Rock tunnel construction considerations include understanding the different methods for excavation in rock, the minimum size tunnel needed for efficient and cost effective rock excavation, how rock strengths impact the feasibility of some methods, how the tunnel length may influence the selection of method, and tunnel construction constraints regarding line and grade. These considerations are presented with the goal of providing the audience with an understanding of how such considerations may impact the design of water transmission pipelines. Examples of designs that were impacted by rock tunneling considerations will be included. The information and examples presented will benefit the attendees by providing them a more thorough understanding of how the constructability considerations associated with tunneling through rock will influence their design and construction costs.

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205 * Thursday, August 29th, 2019 * 2:30:00 PM

Liliana Maldonado, Alexandria Renew Enterprises

AlexRenew's Drop Shaft Design and Physical Modeling

Speaker Bio: Liliana Maldonado joined AlexRenew in 2017 as the director of RiverRenew, a clean water program that mitigates potential sanitary sewer overflows from wet weather events and addresses combined sewer overflows from the City of Alexandria's combined collection system. As Chief of Engineering and Planning, she is responsible for the overall implementation of all design and construction projects, including RiverRenew. She wants the Alexandria community to know that she is proud to lend her expertise to this program in order to achieve healthier waterways for all of Alexandria.

Abstract: Alexandria Renew Enterprises (AlexRenew), the water resource recovery facility for Alexandria, VA is implementing RiverRenew, a major infrastructure program that includes a large-scale deep storage and conveyance tunnel, drop shafts, and deaeration facilities, designed to substantially reduce discharges of sewage mixed with rainwater from Alexandria, VA's combined sewer system to the Potomac River, Hooffs Run, and Hunting Creek. RiverRenew is essential to comply with the Commonwealth of Virginia's 2017 legislation, requires that Alexandria's four existing combined sewer outfalls be brought into compliance by July 1, 2025. Drop shafts and deaeration facilities have been used successfully for delivering flow to tunnel systems since the 1980s. These facilities were pioneered for the Milwaukee Metropolitan Sewerage District's deep tunnel system, which was constructed primarily within rock. The "Milwaukee" drop shaft and deaeration facility includes an approach channel, tangential-inlet vortex chamber, drop shaft, deaeration chamber, orifice, and vent. Based on the anticipated flow rates associated with RiverRenew, the deaeration chamber could be up to 70 feet long and 11 feet in diameter. The proposed RiverRenew tunnel system will be constructed in soft ground, which makes constructing large deaeration chambers very difficult. The drop shaft design was conceptualized to be 'on-line' with the proposed tunnel since the tunnel system will be constructed in soft ground which prohibits the construction of a connecting adit between the drop shaft and tunnel. The difficulty and expense of constructing these large underground deaeration chambers was a main driver for AlexRenew to develop a prototype physical model to study in a laboratory. In addition, testing the design in a laboratory allows AlexRenew to study the ventilation and surge control capabilities of the drop shaft. AlexRenew, in partnership with the University of Iowa – Hydroscience & Engineering C. Maxwell Stanley Hydraulics Laboratory (IIHR) is developing a scaled physical model of the proposed drop shaft to test and optimize the drop shaft design for RiverRenew. The testing goals and objectives include accurately representing the proposed geometry of the drop shaft, flow patterns through the drop shaft, and optimizing the performance of the deaeration chamber contained within the drop shaft. The physical model will also allow RiverRenew to test the efficiency of flow deaeration into the tunnel at varying flow and tunnel depth levels while also providing guidance on further modifications that may improve drop shaft performance. Two physical models representing a 35-ft and 40-ft inside diameter shaft will be constructed and tested in 2019 to evaluate the performance of the drop shaft concept. The test results, observations, and recommendations will be incorporated into the design and construction of the RiverRenew drop shaft.

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206 * Thursday, August 29th, 2019 * 2:30:00 PM

Jeremy Hise, Hazen and Sawyer

Preoxidation Strategies for Reducing Disinfection Byproducts – Don't Forget About Disinfection!

Speaker Bio: Jeremy Hise is a Senior Associate in the Baltimore Office of Hazen and Sawyer. Mr. Hise has an undergraduate degree from Virginia Tech and a Masters Degree from Johns Hopkins. His expertise is water treatment and water quality.

Abstract: The City of Frederick (City) operates a water treatment and distribution system that serves approximately 69,500 residents. The system includes three water treatment plants (WTPs) and two connections that provide treated water from Frederick County. The City has experienced elevated concentrations of disinfection byproducts (DBPs) in their distribution system, prompting a comprehensive analysis of potential strategies for DBP reduction. It was found that one of the DBP sites with elevated DBP concentrations is served mostly by the Mountain Water Supply. This analysis also identified treatment process improvements and distribution system operational modifications for the Mountain Water Supply that could assist in continued compliance with the Stage 2 DBP Rule. The Mountain Water Supply system is composed of the Fishing Creek Reservoir, chemical systems at the Fishing Creek Reservoir, an approximately five-mile-long raw water transmission main, and the Lester Dingle WTP. The current practice of feeding gaseous chlorine to the raw water transmission main results in extended contact between chlorine and raw water natural organic matter (NOM) that forms high concentrations of DBPs prior to reaching the Lester Dingle WTP. Consequently, eliminating the use of gaseous chlorine and replacing it with an alternative preoxidant could reduce the formation of DBPs. The chlorine fed along the raw water transmission main is also used for disinfection. Switching to an alternative preoxidation strategy would result in the need to modify the current disinfection strategy at the Lester Dingle WTP. The preoxidation options evaluated included switching to either potassium permanganate or chlorine dioxide as the preoxidant and complete elimination of preoxidation. Bench-scale testing showed that all three options could reduce DBP formation distinctly. Elimination of preoxidation would decrease DBP concentrations but would not provide biofilm control or oxidation of raw water constituents. Use of potassium permanganate would require continuous monitoring as overdosing can result in unreacted permanganate and give a pinkish color to the water. Chlorine dioxide would decrease the formation of DBPs, provide control of biological growth and oxidation of iron and manganese, and does not present any colored water concerns. This presentation covers the assessment and selection of preoxidation strategy, and presents the basic design criteria of the preoxidation system determined by bench-scale testing. Alternative disinfection strategies evaluated included construction of a chlorine contact chamber, UV disinfection followed by a contact chamber, and UV disinfection. To meet all disinfection requirements by chlorine contact a large clearwell and booster pump station would be needed. A combination of UV disinfection and chlorine contact would require a UV system and small pipe loop as a chlorine contactor (i.e., clearwell). UV disinfection alone could also be utilized to meet all disinfection requirements without a chlorine contact chamber (i.e., clearwell). In this presentation, operational and financial analysis will be presented together for the selection of the disinfection system and some of its basic design criteria.

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201 * Thursday, August 29th, 2019 * 3:00:00 PM
Kevin Slaven, Arcadis
Leveraging Analytics to Make Risk-Based Capital Investment Decisions

Speaker Bio: Kevin Slaven is the Asset Management Practice Leader for ARCADIS. Mr. Slaven specializes in asset management services and brings over fifteen years of experience across the water, wastewater, and electric utility industries. Mr. Slaven has assisted clients with the development of asset management programs that include initiatives on performance management, CMMS development, and capital improvement planning. Mr. Slaven is a member of AWWA's Asset Management Committee and past-chair of the Ohio AWWA's Asset Management Committee.

Abstract: Asset management is switching from a best management practice to a regulatory driven requirement. This presentation will provide the historical background on asset management starting with development of the 2000 International Infrastructure Management Manual to the 2018 ISO 55000 asset management standards updates. The presentation will discuss what asset management is and what industry best practices are, as well as what the state and federal requirements are for asset management. The presentation will provide an update on the states that are requiring asset management programs and how they align with US EPA and WERF best practice guidance documents. There will be a brief overview on the state specific requirements, and how the requirements are being enforced. We will discuss the various gap assessments for international, federal, and state requirements to start the development of asset management programs. The presentation will show provide case studies for a large, medium, and small utility implementing an asset management program. We will focus on the process's utilities went through to develop formal standards for their program, and how the utilities implemented a risk framework to evaluate their risk of failure. The risk framework allows for apple to apple comparison for the risk evaluation. The term "risk-based" is used to highlight the need to focus capital investments on the most critical projects and address an environment of increasing infrastructure needs and funding constraints. The risk-based approach includes training and methodology workshops involving many elements of an organization such as engineering, operations, maintenance, and finance. We will discuss the typical workshops that are required to establish formal and consistent processes and procedures for asset definition, inventory, condition assessment, consequence of failure, and risk assessment. These workshops allow utilities to gain buy-in from staff to effectively identify and prioritize major capital and maintenance projects. The outcomes provide enhanced long-term forecasts that support sustainable financial planning and communicate and strengthen relationships with stakeholders. Finally, we will show how each of the utilities leverage mobile applications, 360 imaging, and business intelligence dashboards as part of their asset management program. We will show examples of BI dashboards for linear and vertical assets to make informed risk-based capital investment plans. The mobile applications, 360 imaging, and BI dashboards will show the evolution of data collection and reporting for these utilities.

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202 * Thursday, August 29th, 2019 * 3:00:00 PM

Carita Parks, HDR

Outreach & Communication for Today's Water Customer

Speaker Bio: Carita Parks is a Senior Communications Coordinator in HDR's Mid-Atlantic region. Carita brings over 15 years of public and private sector experience developing beneficial relationships with stakeholders, executing innovative internal and external communications campaigns, providing creative direction for communications materials, writing strategic plans, and directing interdisciplinary teams. Carita earned her Masters in Business Administration from Jacksonville University and Bachelors of Science in Communications from the University of North Florida.

Abstract: Every day, we come to work with one purpose – to provide a safe, efficient and dependable source of water to our customers. We understand the process to deliver that water can often be taken for granted by those we serve. Tactical and personable public outreach about our water system can not only help in educating our customers, but it helps mitigate potential social and political risk. As leaders in the water industry, attendees of this session will learn how an investment in public outreach and engagement will: Gain public and political support for future projects and programs; Decrease the risk of schedule and budgetary losses from public outcry; Instill trust and confidence with the public in their utility entity. Case Study: Denver Water North System Renewal Project. Even though the utility had the legal authority to begin excavation and construction in the project area, they understood that clearing the easement might come as a shock along the quiet, 8.5 mile residential alignment. To meet this challenge, Denver Water and HDR developed an and outreach plan that blended traditional tactics with digital ones. Online meetings and an educational web-tutorial helped landowners understand the project's purpose and schedule, while kitchen table meetings helped minimize schedule impacts and reassured property owners. Paper easements and historical property documentation for 195 landowners were digitized by HDR to augment land management and public engagement. Land agents met with all families in their home to document concerns. By tracking every interaction with landowners, municipalities and agencies, Denver Water was able to create a 360° view of participation and communication efforts. Outreach summary reports tracked action items and elevated critical issues on a weekly basis. The right mix of high-tech and high-touch is critical in today's infrastructure projects, as exemplified by Denver Water's efforts. HIGH-TOUCH OUTREACH INCLUDES: Face-to-face interaction and printed materials. Benefits of this outreach: fosters personal relationships; most suitable for an older demographic; effective for very defined geographic areas; appropriate for sensitive information. Tactics that can be used include: public meetings, direct mail, door hangers, one-on-one meetings, newspaper ads and stories, flyers, posters and billboards. HIGH-TECH OUTREACH INCLUDES: Web-based and on-air communication. Benefits of this outreach: allows for viral promotion; effective for large geographic areas; low cost per person reached; appropriate for high-level information. Tactics that be used include: interactive websites, online public meetings, videos, radio interviews, telephone town halls. By integrating these high-touch and high-tech outreach tactics early and often into water projects, the risk associated with political or social controversy can be mitigated, allowing current and future projects to be supported by those who could derail them. It's not just about outreach during projects, either. Continuous story-telling through social media, video, and easy-to-understand infographics about the importance of water, the processes it takes to make it safe for public use, and the people behind the work, give the public a positive, appreciative feeling about the utility. This disposition encourages more understanding and appreciation for the important work our public utilities do every day.

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203 * Thursday, August 29th, 2019 * 3:00:00 PM

Jeremy Koch, AECOM

Alternative Advanced Treatment Approaches for Reduced Capital and Operating Costs – Technologies and Case Studies

Speaker Bio: Jeremy's technical and project delivery experience is focused on assisting municipal, commercial, and industrial clients on a broad spectrum of potable water, wastewater, and water management issues. His work has included treatment facilities, distribution/conveyance systems, biosolids management, land application, water reclamation, materials handling, and energy savings, recovery, and generation. Jeremy's process engineering includes evaluation and design for over 30 treatment facilities ranging in capacity from less than 0.1 to over 250 mgd.

Abstract: As the quality of municipal wastewater treatment effluent has improved, because of nutrient removal and no discharge initiatives, the industry and public perception of usability and value of the water has improved. Simultaneously many regions of the country are faced with water supply availability limitations resulting from consumptive use limitations, reductions in natural supply, or increasing development usage. Consistently communities are looking with greater interest toward water supply augmentation with both direct and indirect potable reuse. These include such efforts as groundwater recharge through sub-surface injection and reservoir augmentation. To meet the stringent requirements for water supply augmentation the majority of completed and ongoing projects provide full advanced treatment of secondary effluent using reverse osmosis (RO) and advanced oxidation process (AOP), typically consisting of low pressure membrane filtration and post treatment processes to provide adequate pretreatment for downstream RO water stabilization before being placed into the conveyance system. While the full advanced treatment has been proven to produce product water that can meet Federal and State(s) drinking water MCLs for Cryptosporidium/Giardia/Virus removal and other specific requirements, intensive energy use, high capital cost and the need for proper treatment and disposal of RO concentrate streams have become major drawbacks for implementing full advanced treatment in such advanced treatment projects. To address those concerns, alternative treatment trains (non-RO based trains) have been developed. In this presentation the baseline parameters for final effluent water quality will be defined, the range of available treatment technologies currently capable of meeting the requirements will be covered, and the reliability expectations for such systems discussed. Based on those defined parameters alternative technologies in use and currently being developed for full implementation will be discussed. This will include the merits, capabilities, and challenges of alternative advanced treatment trains, along with various strategies to meet potable reuse water quality criteria while controlling capital and life cycle costs. Discussions will include case studies of completed, ongoing and pending projects covering a range of topics. Other factors impacting alternative technology acceptance related to local conditions, regulatory expectations and public acceptance will be generally discussed as well.

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204 * Thursday, August 29th, 2019 * 3:00:00 PM
Craig Camp, GHD
Rehoboth HDD Ocean Outfall

Speaker Bio: Mr. Camp has over 35 years of experience in underground construction. His expertise encompasses all phases of microtunneling. He has been involved in over 150 microtunneling projects installing over 300,000 feet of pipelines. He has worked with contractors, engineers, and owners to resolve project issues.

Abstract: The City of Rehoboth Beach is required, under the terms of a consent order from the Dept. of Natural Resources, to eliminate the discharge of treated effluent from the Rehoboth Beach Wastewater Treatment Plant into the Lewes-Rehoboth Canal. The city, after detailed studies and the evaluation of all options, proposed an ocean outfall in order to comply with that order. On August 14, 2017, the Rehoboth Beach Commissioners unanimously approved awarding four bid packages to various contractors to begin construction on the ocean outfall project. The four bid packages were treatment plant improvements, effluent pump station, on-shore pipeline, and offshore pipeline including a diffuser to comply with the consent decree. This paper will discuss the purpose and design of the project including pipeline routing, construction alternatives, regulatory requirements, the construction season, and environmental concerns. The project design included pipeline routing, construction alternatives, and regulatory requirements. One of the biggest impacts to the project was the proposed construction season requiring the marine work to be completed in winter and the system operational by June 30, 2018. The winter of 2017-2018 was most notable for four nor'easters in March, which directly affected marine construction. The paper will conclude with a brief summary of construction details from the actual construction of the 6,000 feet of outfall including diffuser. 3,800 feet of the outfall was completed using horizontal directional drilling. Construction of the marine outfall commenced November 2017 and was completed before the June 30, 2018 deadline.

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205 * Thursday, August 29th, 2019 * 3:00:00 PM

Ted Denny, HDR Engineering Inc.

Collaborative Construction Scheduling Expedites Successful Pump Station Start-up

Speaker Bio: Bachelors and Masters Degrees in Civil Engineering from Old Dominion University. Have worked on the construction side of the water/wastewater field for 6 years while employed at HDR Engineering.

Abstract: The purpose of this abstract and paper is to present a case-study of the start-up, testing, check-out, training and acceptance for the HRSD Bridge Street PS. The expected conclusion is a step by step process for successful start-up. The steps outlined will be suitable for use on other similar projects as a way to implement lessons learned. Case study examples will be used to justify the importance of certain tasks contained within the steps. Months in advance of a Consent Order Deadline, scheduling and sequencing the start-up, testing, check-out, training and acceptance was underway for the new self-cleaning 16.6 MGD HRSD Bridge Street PS. The station consists of three 300-horsepower pumps, two 75-horsepower pumps, 2-stage odor control system, and a 750-kW standby generator. Collaboration between Contractor, Owner and Engineer developed methodologies and criteria that could be measured for acceptance, allowing the team to work towards a common expectation of critical system readiness. The steps outlined below can be used as a guide for future projects. Step one was completed by the Engineer who outlined 38 individual acceptance tests that spanned multiple pieces of equipment and disciplines which were required to demonstrate system performance. Step two was a collaborative effort to identify concurrent testing approaches. Step three identified sequencing and responsibilities between all team members, and the fourth step included scheduling manufacturer training. The four step process produced a single table that listed all tests, responsibilities, and scheduled dates that were reviewed daily by the team. This approach was used by the Contractor to establish construction completion dates that would allow sufficient time for start-up activities. The team collaboratively developed a clean-water recirculation testing plan that allowed tests to be conducted concurrently. Clean-water testing included operating pumps to the maximum capacity, local/remote monitoring/control, power fail restart, and instrumentation. Further, the team members worked two separate shifts onsite during testing days to maximize equipment runtime and monitor for issues. Testing to meet an expectation identified several components that needed attention including pump vibration, delays in standby power initiation, and instrumentation settings that required troubleshooting. However, the expedited testing program allowed sufficient time to resolve critical equipment issues so that trust was developed with the systems to operate reliably and safely.

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206 * Thursday, August 29th, 2019 * 3:00:00 PM
Paul Nyffeler, AquaLaw PLC
P-F-What? Unregulated Contaminants and the Path to Regulation

Speaker Bio: Dr. Paul Nyffeler is a senior associate at AquaLaw, after nine years in the litigation practice at a major international law firm. In addition to his environmental and general litigation experience, Paul brings a deep scientific background, with his Ph.D. in chemistry.

Abstract: The presence of unregulated contaminants in drinking water, combined with growing public awareness and concern, has caused unprecedented challenges for the drinking water industry. From the nationwide discovery of PFOA/PFOS contamination originating from firefighting foam and other sources to the decades long contamination of the Cape Fear River in North Carolina by GenX (a successor chemical to PFOA), the detection, tracing, and removal of PFAS compounds has proven difficult and expensive. This presentation will discuss the challenges presented by PFAS to the drinking water industry, and the path by which unregulated contaminants become subject to state and federal regulation.

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201 * Thursday, August 29th, 2019 * 4:00:00 PM

Charles Card, GHD

Vallejo Flood and Wastewater District's Pragmatic Asset Management Journey

Speaker Bio: Charlie is a Sr. Asset Management Advisor with GHD. He has 32 years of experience in the Water/Wastewater Industry as a Utility Manager and as a consultant. Prior to becoming a consultant, he served as Asset Strategy Manager and FOG Program Manager for the Washington Suburban Sanitary Commission. He's a member of the Chesapeake Water Environment Asset Management Committee and the Pennsylvania Water Environment Utility Management Committee. Charlie is a certified Project Management Professional and holds a B.S. Degree in Biological Sciences from the University of Maryland.

Abstract: The objective of this presentation is to share the major steps taken by the Vallejo Wastewater and Flood District (VFWD or the District) from the beginning of the asset management (AM) program through the development of AM plans, including the development of capital improvement program (CIP) projects as well as the AM program support of the Computerized Maintenance Management System (CMMS) implementation. Key lessons learned during the major steps will be shared with the audience. The VFWD was founded in 1952 and provides wastewater treatment services to 123,000 residents in and around the City of Vallejo through a 10 mgd average daily flow wastewater treatment plant (with a peak hydraulic capacity of 60 mgd), 38 lift stations, and over 430 miles sewer pipes (including laterals). To maintain continued service delivery while responding to upcoming infrastructure renewal needs, the District embarked on a comprehensive AM program with the following major milestone steps: 1) Gap assessment and roadmap development; 2) Pilot AM plan around the solids process; 3) Treatment plant AM plan; 4) Lift stations AM plan; and 5) Collection system AM plan. Condition (desktop and field assessment for critical assets), consequence of failure (COF), and the resulting asset risk profiles were developed for the wastewater treatment plant (WWTP), lift stations, and the collection system. Less than seven percent of the WWTP assets are in poor to very poor condition whereas 43 percent of the lift station assets were assigned poor to very poor condition ratings. Twelve percent of the collection system pipes in terms of length are in poor to very poor condition. Capital projects developed for the WWTP improvements over the next ten years cover 30 individual projects, totaling over $45 million in 2018 dollars. Similar project listings for the lift stations and the collection system improvements have also been developed under their respective AM plans. One of the more unique sections of the AM plan is the inclusion of staffing needs based on modeled maintenance cost projections. A shortage of four maintenance staff was projected over the next 30 years, excluding any additional staff to prepare for upcoming potential retirements. During the execution of the AM program, the District also focused on selecting a CMMS. The asset registers generated were reformatted to match the data transfer format of the new CMMS. Some preventative maintenance activities that were developed during the generation of the AM plans will be used as inputs into the CMMS in addition to the other inputs that will be developed as part of a future maintenance master plan.

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202 * Thursday, August 29th, 2019 * 4:00:00 PM
Chris Mansfield, GHD Inc.
Sun Shines Brightly on Latest Cecil County Solar Project

Speaker Bio: Diploma from Lincoln Technical Institute as Electronics Systems Technician and Associates Degree in Electronics Engineering Technology. Electrical Designer with over 9 years experience in design and implementation of electrical and control systems related to water and wastewater assets.

Abstract: Cecil County, Maryland has installed several photovoltaic (PV) systems at public facilities to generate solar power and reduce greenhouse gas emissions. This project chronicles the County's first PV system installed at one of their wastewater treatment facilities. In 2017, the County applied for, and obtained, grant funding from the Maryland Department of the Environment's Energy Water Infrastructure Program used to fund the construction of a 76.2 kW DC capacity PV system at their Northeast River Advanced Wastewater Treatment Facility (WWTF). The system was installed on the roof of the new Membrane Building, which was constructed two years prior as part of the Enhanced Nutrient Removal Upgrade of the facility. Installation of the new system was completed in September 2018 and is capable of generating approximately 90,000 kWh per year in electrical energy; helping to offset approximately 5% of the energy used for the 2.0 mgd-rated facility's treatment operations. In order to expedite implementation of the project to utilize the grant funding within the allowed time-period, the County chose to utilize a Design-Build approach. With the help of an Owner's Adviser, the County developed a Request for Proposal for the design-build effort. Two proposals were received, with Altenergy, Inc. selected by the County as the Design-Builder with a bid amount of $186,529. The rooftop mounted PV system was able to be installed on the existing sloped metal standing seem roof without structural modification. The treatment plant's electrical system features a large 4000 amp switchgear, 4000 amp Transfer Switch, and an emergency generator. The PV system includes (206) 370-Watt roof-mounted modules wired to two SolarEdge 33.3kW inverters. The individual inverter outputs were then combined for a final, single, connection to a spare circuit breaker in the switchgear "upstream" of the automatic transfer switch and emergency generator connection. Modifications were also required to the interconnection point circuit breaker in order to meet electric code requirements. With ENR treatment requirements increasing power usage at many Maryland WWTFs, solar systems like this one are one way to offset all or part of that higher energy usage.

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203 * Thursday, August 29th, 2019 * 4:00:00 PM

Stephanie Spalding, HDR

Worthless Dust or Valuable Resource? Drying Thermally Hydrolyzed Solids the Right Way.

Speaker Bio: Stephanie Spalding is a Project Manager in HDR's Virginia Beach, VA office. With 17 years of experience, she specializes in biosolids pretreatment and advanced anaerobic digestion, as well as dewatering equipment replacements, including equipment evaluations and complicated retrofits into existing facilities. She has a BSE in Civil/Environmental Engineering from Duke University and a Master's in Environmental Engineering from Old Dominion University and is a registered PE in Virginia. Stephanie is actively involved with Virginia WEA and the Virginia Section of AWWA.

Abstract: The main benefit of implementing THP upstream of drying is a reduction in the energy required for the latter process by up to 40 to 50 percent when compared to conventional anaerobic digestion due to the higher solids concentration of the dewatered thermally hydrolyzed solids (THS), and the improved volatile solids (VS) reduction achieved through digesting THS. Therefore, the implementation of THP can either increase capacity of an existing drying facility or reduce the size of a planned new one. Additionally, the lower evaporation demand of the drier THS cake can increase the feasibility of lower temperature thermal drying technologies that recover waste heat from processes such as the THP and combined heat and power (CHP). Another benefit of implementing thermal hydrolysis upstream of drying is the additional flexibility in the dryer design and configuration. If all the solids are processed through a THP that meets the regulatory requirements for Class A exceptional quality (EQ) biosolids, the subsequent dryer process is not required to meet Class A requirements. This allows the dryer to be sized and operated to achieve the dryness desired for product quality, providing flexibility in equipment sizing and configuration as well as heat source requirements, allowing for the recovery and beneficial use of lower-grade waste heat in certain dryers, rather than relying solely on digester or natural gas for drying. For facilities that use biogas as the primary fuel for the dryers, the implementation of THP can result in two or three times more biogas available for other uses such as electricity or biomethane production. Recent presentations have demonstrated the attractive mass and energy balances for the combination of THP and drying. However, there little published literature describing how THP changes the characteristics of a dried biosolids product, which impacts the suitability and desirability of the end product for beneficial uses. The high temperature and pressure of THP destroys the cell structure of the solids, leading to improved VS destruction, and results in a drier soil-like cake. While the qualities of this Class A cake are beneficial for land application, the different characteristics are less desirable in a dried product. Of particular concern are the end product's energy content, friability and bulk density. The presentation will provide a detailed discussion of reference facilities and correlations between THP configurations[SS1] and dryer technologies as well as provide analysis of the impacts of process configuration on the dried THS end product. The audience will be able to view and handle samples of the end products from some of the facilities described. As more utilities realize benefits of THP, there will be greater interest in beneficial use of hydrolyzed solids beyond the land application of Class A EQ cake product. Additionally, jurisdictional limitations on cake land application will drive facilities to retain the end use flexibility of a dried product even as they consider implementation of THP. These facilities will benefit from this work as they evaluate THP and thermal drying configurations to optimize the quality of the end product.

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204 * Thursday, August 29th, 2019 * 4:00:00 PM

Kai Loon Chen, DC Water

Flushing of Premise Plumbing After Full Lead Service Line Replacements: Field Studies in Washington, D. C.

Speaker Bio: Dr. Kai Loon Chen is a Program Manager in Research and Development in the Water Quality and Technology group of DC Water. He received his Ph.D. in environmental engineering from Yale University. Before joining DC Water, Dr. Chen was an Assistant Professor in environmental engineering at Johns Hopkins University for nine years. His research at DC Water focuses on drinking water quality in the distribution system and water treatment and purification technologies.

Abstract: The exposure of drinking water to lead service lines and lead-containing solder and plumbing fixtures and fittings can result in the release of lead into the water. To reduce the occurrence of lead contamination of drinking water, drinking water utilities around the country, including DC Water, have been carrying out lead service line replacements (LSLRs). After a LSLR has been conducted, elevated particulate lead concentrations can be observed in the tap water due to the cutting, vibration, and other disturbances of the premise plumbing during the replacement process. As one of the utility participants in a nation-wide study led by Cornwell Engineering Group on the flushing of premise plumbing after full LSLRs (FLSLRs), DC Water had conducted field studies at nine homes in Washington, D. C. from 2018-2019 to investigate on and evaluate the effectiveness of two methods to flush the premise plumbing after FLSLRs to reduce lead concentrations in drinking water. The two flushing methods investigated are flushing from all taps simultaneously and flushing one tap at a time. At each of the nine homes, whole-house, high-velocity flushing was conducted with the aerator removed with one of the two methods. Profile sampling was conducted before the FLSLR and one day, two days, one week, two weeks, and two months after the FLSLR. Both filtered and unfiltered samples were analyzed for lead, iron, aluminum, copper, manganese, tin, and zinc. We also collected samples during the whole-house flushing of the premise plumbing to determine if the flush was effective and if the flush duration was sufficient. In this presentation, we will compare DC Water's data of metals released from the premise plumbing components (faucet, point-of-entry, service line, etc.) with relation to before and time following the FLSLR. The WRF Project 4713 data collection is on-going and complete analyses of flushing methods will be included in the report.

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205 * Thursday, August 29th, 2019 * 4:00:00 PM
Carlos Espinosa, Baltimore City DPW - Office of Asset Management
Collection System Challenges in Urban Settings and Innovative Solutions

Speaker Bio: Carlos Espinosa has 38 years of experience in design, operation and evaluation of water, stormwater, and wastewater systems. As Chief of Asset Management in Baltimore DPW, his mission is to maximize the life of DPW assets by implementing preventive maintenance programs, and applying asset management principles. Mr. Espinosa holds engineering degrees from the US Naval Academy and from Johns Hopkins University. He is a registered professional engineer in MD, VA, and DE; and is the recipient of the CWEA Golden Manhole, and is a member of the Select Society of Sanitary Sludge Shovelers.

Abstract: The Baltimore Fatberg - In September 2017 the Baltimore City Department of Public Works (DPW) reported a sanitary sewer overflow (SSO). Following a site investigation and condition assessment, DPW determined that the 24" sewer pipe was choked with fats, oils, and grease (FOG). Known as the "Baltimore Fatberg", the 20-foot congealed FOG mass made national news, and caused the release of more than 1 million gallons of sewage into Jones Falls. Removing it was no easy task. The job, estimated at about $60,000, required water jets, a scraper, and a vacuum truck to suck out the fatberg and surrounding debris. Damaged Infrastructure During the 2018 July Storms – During severe storms in July 2018 debris in streams struck and damaged sections of the sanitary sewer infrastructure, causing millions of gallons of diluted sewage to overflow into the Gwynns Falls and Maidens Choice streams. DPW's first priority was to abate the SSOs by setting up bypass pumping. At both locations, setting up bypass was very difficult and expensive. SSO Event Notification System (ENS) – In 2017 Baltimore City DPW installed a network of flow meters capable of alarming the department at the onset of SSOs at selected locations. The locations were identified as chronic SSO sites by means hydraulic modeling. The ENS network provides more accurate estimation of the SSO Volume. Leveraging Information - Over the past year Baltimore DPW has implemented various on-line interactive maps. These maps provide real time information to internal staff and to the public, and include Water Main Breaks, Sanitary Sewer Overflow, High Grass and Weeds Maintenance Program, CIP construction Projects.

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206 * Thursday, August 29th, 2019 * 4:00:00 PM

John Civardi, Mott MacDonald

The Waters of Life - Protecting Our Veterans with a State of the Art Membrane Plant

Speaker Bio: Mr. Civardi has a BE and ME from the Stevens Institute of Technology and has over 30 years of experience in the drinking water industry. He is Mott MacDonald's global water treatment practice leader. He is a co-author of AWWA's 2nd edition of the Iron and Manganese Handbook

Abstract: The Veterans Administration (VA) Perry Point facility includes a water treatment plant and distribution system that has a capacity of 1 MGD. The water treatment plant is over 50 years old and has reached the end of its useful life. Source water is obtained from the Susquehanna River and the river is characterized by high turbidity and TOC. The river has a large watershed and is subject to potential contamination due to spills and run off. The population served by this facility consist primarily of veterans and advanced water treatment system was necessary. The water treatment plant is also characterized as a “mission critical” facility. Mission critical required that the new plant be designed to withstand an exterior blast and thus special construction was needed for the exterior and interior equipment had to be designed to minimize damage to essential water treatment components. This presentation will describe the design, permitting, construction and commissioning components of the project. The new plant consists of: Advanced source water monitoring to detect spills in the river, new raw water pumps, plate settler clarification, hollow fiber membrane filtration, granular activated carbon for enhanced removal of organic compounds, and chlorine dioxide for additional pathogen inactivation. Key aspects of the project that will be discussed include: (1) Selection of the membranes – an evaluated bid was performed that considered economic and non economic factors. Once the membrane system was selected detailed drawings the entire water treatment plant were prepared. The purchase of the membrane equipment was assigned to the general contractor. (2) Integration of organics removal – both GAC and PAC were considered. GAC was selected due to its ability to handle changes in water quality without the need for operator input as well as the potential for PAC to damage the membranes. Due to the low backpressure of the membranes, the hydraulics of the GAC system were optimized by minimizing head loss and lowering the floor of the GAC area. (3) Optimizing Clarifier Performance - In order to accommodate the fluctuations between the hydraulic demands of the membrane system and to maintain a uniform flow to the plate settlers, two equalization tanks were provided between the plate settlers and the membranes. These tanks will allow for a constant flow through the plate settlers. Additional optimization of the clarifiers was provided by using: inline mechanical mixers for rapid mixing and three stage flocculation. Chemical feed facilities were provided to feed alum and polyaluminum chloride. (4) Commissioning – the new facility was commissioned while the existing plant remained in service. Initial hydraulic testing of the new plant was performed using treated water from the existing plant.

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201 * Thursday, August 29th, 2019 * 4:30:00 PM
Jay Marchi, ProPump Services
The Cost Benefits of In Situ Electric Motor Testing.

Speaker Bio: John (Jay) Marchi is a veteran of the US Navy and was a large truck mechanic prior to obtaining his Bachelor of Science degree in Electrical Design Engineering Technology in 1985 from Pennsylvania State University. He is currently employed by ProPump Services (PPS), an engineering and diagnostic consulting firm located in Bethlehem Pennsylvania. Jay is a specialist with over 31 years of experience in rotating equipment diagnostics and system analysis. He is certified a Vibration Analyst by the ASNTesting section SNT-TC-1A, Level IIIA, and ISO Vibration Cat III.

Abstract: Unanticipated and after hour repairs or replacement of critical equipment results in higher cost in terms of expedited parts, equipment, and overtime labor rates. Being able to detect and anticipate faults before they become critical, or even result in catastrophic failures, provides measurable cost savings and less strain on the workforce and maintenance budgets. There are many cost-effective portable tools that have become available over the past 10 to 15 years that were once only found in repair shops or laboratories. One very effective predictive maintenance tool is electric motor testing. Testing motors while in service takes little time with minor disruption to operations. This presentation will discuss the six motor fault zones tested to determine the quality of the power to the motor; the power circuit, and the condition of the stator and rotor. Case studies are presented to demonstrate how the information provided by the testing was used to identify specific problems before they become catastrophic.

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202 * Thursday, August 29th, 2019 * 4:30:00 PM

Crystal Knight-Lee, Washington Suburban Sanitary Commission

A Best-Practice Approach to Affordability: How WSSC is Re-tooling its Customer Assistance Programs to better meet the needs of its Low-income Customers.

Speaker Bio: Crystal Knight-Lee is WSSC's current Director of the Customer Service Department and has worked for the Commission for over 11 years. Knight-Lee received her Bachelor of Science degree in Business from Towson University in 1992. She earned her graduate degree in Applied Behavioral Science from Johns Hopkins University in 2003 and a Certificate in Strategic Management in 2008. She is a 2011 graduate of the National Forum for Black Public Administrators Executive Leadership Institute and served on the board of the Association for Strategic Planning.

Abstract: Affordability emerged as a significant concern during the development of WSSC's new rate structure in 2018 and the utility initiated a top-to-bottom assessment of its customer assistance programs to determine if they were adequately meeting the needs of low and limited income customers. This critical assessment, which utilized U.S. Census microdata to develop a comprehensive demographic profile of WSSC's customer base, revealed that the existing programs did not fully address the affordability needs of the utility's universe of vulnerable customers. WSSC's roadmap to achieving a world-class customer assistance program is based on best practices and innovative approaches to affordability that have emerged within the industry over the past decade. This roadmap balances the financial and conservation requirements of the utility with the assistance needs of its customers. It recognizes that a customer's ability to pay may be influenced by factors other than income, so a complete affordability solution will include a variety of services, including programs that help customers reduce consumption, address temporary hardships, and manage arrearage. This presentation will explore how WSSC performed a comprehensive assessment of its customer assistance programs, identified the level of need within its customer base, and designed programs and services that will better meet the long term affordability needs of its customers. This exploration will provide insights for customer service managers and utility executives on how to use readily available Census data to estimate program need, evaluate program utilization and effectiveness, evaluate the financial impacts of proposed program enhancements, and identify innovative affordability solutions that are tailored to the demographic characteristics of a service area.

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203 * Thursday, August 29th, 2019 * 4:30:00 PM

John Cannon, GHD

Conversion of Conventional Aerobic Digesters to an Autothermal Thermophilic Aerobic Digestion (ATAD) process for Class A Biosolids

Speaker Bio: John Cannon is a project manager with over ten years of experience in the design and construction of wastewater treatment plants. He has contributed to design or construction of facilities in Maryland, Delaware, New York, and Virginia, including the Front Royal WWTP Upgrade and Expansion in Front Royal, VA.

Abstract: The Front Royal WWTP was upgraded in 2017 to replace the existing Aerobic Digesters with a new Autothermal Thermophilic Aerobic Digestion process. During the conversion of the existing system, unexpected operational and sequencing challenges appeared which delayed construction and plagued the initial operation of the system. During optimization, months of experimentation were required to identify the optimal sludge parameters for feeding the ATAD tanks. Ultimately the ATAD system was optimized and now operates in the desired temperature range for the production a Class A Biosolid. Several lessons can be learned from the story of this project that are applicable to both new and retrofit ATAD installations that would benefit facility owners interested in implementing this innovative treatment technology.During the construction of the ATAD and SNDR Tanks, sequencing was established to maintain operation the existing Aerobic Digesters for as long as possible while the conversion was underway. This required that upon conversion to ATAD Tanks, operation would continue in "conventional mode" (using the new aeration and mixing without the ATAD controls) as the SNDR tank was converted. Operation in conventional mode did not go as expected. While the theoretical air demand was capable of being met by the new blowers, the operating DO in the ATAD tanks was consistently lower than 1.0 mg/L. This resulted in poor volatile destruction and excessive odors. It was ultimately determined that a combination of factors resulted in the poor operation during conventional mode, including overfeeding of solids, insufficient air supply, and excessive temperature due to the installation of the ATAD covers. The poor operation during conventional mode continued until the final digester was converted into an SDNR tank and true "ATAD mode" operation could begin. The limited success of conventional mode had caused the operations staff to limit the amount of waste sludge removed from the secondary treatment system. This put pressure on the operators to increase wasting to the ATAD system once "ATAD mode" was initiated. In the initial months of operation, mixed results were observed as the ATAD system struggled to maintain thermophilic temperatures under the aggressive loading regime required for secondary system optimization. In the spring of 2018, the average WAS feed volumes exceeded 50,000 gallons per batch. Processing large batches depressed the ATAD operating temperature, requiring longer batch times in isolation before the Class A operation was achieved. It took several months of trial and error by the operations staff to arrive at a more stable feed rate of 35,000 gallons per batch to achieve consistent ATAD temperatures and to demonstrate performance at the system's full potential. Lessons Learned: If sequencing in conventional mode, provide supplemental air beyond what is theoretically required and take care not to overload the basins with solids. If converting to ATAD from another process, begin operation in "ATAD mode" as quickly as possible. Manage solids transfers out of the secondary system during construction to avoid excessive loading during optimization. Don't rush into Class A operation – allow the process time to stabilize.

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204 * Thursday, August 29th, 2019 * 4:30:00 PM
Pat Burke, Ferguson Waterworks
Introduction of Equipment and Methods for Flow/Pressure Testing Hydrants

Speaker Bio: Pat started in 2006 with Ferguson and has a very strong background in supply chain management. He was operations manager for 5 years. This included 8 locations, and $9 million dollars worth of inventory. His unique experience helped promote him to outside sales in 2014, and help provide customers with supply chain solutions to help suit the client's needs. Pat is currently on the Maryland Rural water board of directors, has won a NUCA of DC member of the year, and is the current vice-chair of the CSAWWA distribution committee.

Abstract: Objective 1: Introduce a variety of Testing equipment and how to properly use them to achieve accurate results. Using methods from AWWA M17 you will see how to best gather flow data and extrapolate to a rated capacity on either a Hydrant or a Main. These results will assist with color coding of your hydrants and provide helpful data for your ISO rating. With many new devices on the market, knowing the expectations of each will guide you to purchasing or utilizing the correct equipment. Objective 2: Learn how to conduct a flow test using 2 hydrants with a single person. This method can save you manual labor and let you record your data for accurate record keeping. This is very helpful for departments that spare that extra person in the field.

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205 * Thursday, August 29th, 2019 * 4:30:00 PM

Jessica Shiao, WSSC

Looking Back to Look Forward: Getting to the Root Causes of BBKs and SSOs

Speaker Bio: Jessica Shiao is a Project Manager in the Sewer Condition Assessment section of the Water/Wastewater Systems Assessment Division.

Abstract: The Washington Suburban Sanitary Commission (WSSC) has developed and conducted "Surcharge Studies" in selected minibasins to address reported Building Backups (BBKs), Sanitary Sewer Overflows (SSOs), and surcharge conditions resulting primarily from wet weather events. The purpose of the Surcharge Study is to determine and evaluate the root causes potentially contributing to BBKs, SSOs, and surcharge conditions and to develop specific recommendations to alleviate or eliminate the problems. The recommendations are based on a Desktop Analysis, which reviews Work Order Histories for over a ten-year period for each associated pipe segment and field investigations that are performed to assess/verify the conditions. Wet weather conditions can cause sewage from sanitary sewer lines to back up into homes through service laterals and drain pipes. Damages resulting from these backups are often difficult and expensive to repair, but more importantly, create discord with the homeowners and customers. WSSC places a high value and priority in providing excellent service to their customers. Thus, simply addressing existing BBK issues is not enough; WSSC must also be proactive in preventing them. BBKs, SSOs, and surcharge conditions can be caused by blockages or failures in the main line or service lateral as a result of root intrusion, pipe deterioration, debris, or inappropriate disposal of fats/oils/grease, wipes/rags, etc. It can also be caused by storm water and groundwater entering the sewer system during rain events creating capacity issues in the main line. The purpose of the Desktop Analysis is to determine the root causes potentially contributing to the reported incidents. Asset Timelines are developed from Work Order History reports for each sewer pipeline associated with each reported incident. The Asset Timeline indicates the date and location of the reported BBK/SSO event, the reported cause, the maintenance and/or actions performed in the field, weather conditions at the time of the reported incidents, etc. Field investigations such as manhole and CCTV inspection, smoke testing, and dye testing are conducted to clarify and/or verify causes of the reported BBK/SSO incident and to confirm system configuration. The Asset Timeline allows us to correlate the reported incidents to the associated sewer asset, review in detail the chronological events and reporting that occurred on the pipeline, and assists us in making the best recommendations based on the totality of the pipe and actions taken over the past 10 years. Preventive Maintenance (PM) frequencies are reviewed and are recommended for modifications, if needed, and repair/rehab/replacement recommendations are made based on the inspection results and/or the effectiveness of the PM work. The next step in the program is to implement the recommendations and to verify the alleviation of the BBK/SSO issues. Lessons learned during the implementation process will allow us to refine the methodology as we continue with the surcharge work in other prioritized areas.

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206 * Thursday, August 29th, 2019 * 4:30:00 PM

William Morales-Medina, Rutgers University

Comparing the Microbial Community and Water Quality Changes During Biofilters Acclimation Period

Speaker Bio: I am a born and raised Puerto Rican. I have a BS degree in Environmental Microbiology and a Masters in Biology from the University of Puerto Rico. I worked understanding the Microbiology of anaerobic reactors for biogas production. Right now I am doing a PhD in Microbiology and Molecular Genetics at Rutgers University. My research is focused on understanding the development and persistence of antibiotic resistance genes and pathogens in sewer pipes biofilms. In fall 2018 I did an internship at WSSC. Here I worked on the development of full scale biofilters in a water filtration plant.

Abstract: Biofiltration has the potential to simultaneously reduce disinfection byproduct (DBP) formation and to control manganese using controlled biological growth. Washington Suburban Sanitary Commission (WSSC) began biofiltration pilot testing in August 2018. The pilot includes two full-scale sand-anthracite filters that were turned into biological filters by stopping the addition of disinfectant ahead of the filters, and two chlorinated filters that serve as experimental control. Acclimation of full-scale biofilters is a slow process that can take more than 200 days, during which filters are not yet optimized for contaminant removal. During biofilter acclimation, microbes attached to the filter media adapt and grow, forming a metabolically active biofilm capable of removing contaminants. Because during acclimation, biofilms are not fully developed, microbes are more susceptible to abiotic factors like chemical toxic contaminants and physical stress from regular filter operation processes, like backwashes, which can delay acclimation. In this research, we studied the microbial community over time and assessed how it changed based on water quality parameters. Our main focus was manganese (Mn) and organic matter removal. We measured pH, chlorine, Mn and total organic carbon (TOC) concentration twice a week throughout the acclimation period. Media samples for biological activity (by ATP) and microbial community analysis were collected each two weeks. Headloss and other operational parameters were also monitored. DNA from the media samples were extracted and submitted for 16S rRNA gene amplicon sequencing. Quantification of genes involved in Mn oxidation was performed using qPCR. Preliminary results showed that after four months, we had not yet seen consistent Mn or TOC removal in the biofilters even though ATP measurements suggested that the biofilm was developing. Since acclimation can take up to seven months, we will continue our monitoring and sampling until acclimation is achieved. Overall, our data will provide a novel genomic view about the ecology of biofilter microbial communities. This knowledge will be useful for optimizing and accelerating biofiltration for improving drinking water quality.

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201 * Thursday, August 29th, 2019 * 5:00:00 PM

Doug Adams, Baltimore County Department of Public Works

Incorporating the Lateral Sewer Asset Registry into GIS: Supporting the Enterprise Infrastructure

Speaker Bio: Doug is the GIS Program Manager for Baltimore County, Maryland's Department of Public Works. He has over 30 years of experience in the geospatial industry. Doug is an adjunct professor at Towson University where he teaches GIS Database Design and Interpretation of Aerial Photographs. He is also an instructor at the University of Minnesota Morris Wind STEP program, a two-week study in alternative energy, where he teaches GIS. Doug holds a bachelor's and master's degree in geography and environmental planning from Towson University.

Abstract: Over the past 25 years, Baltimore County has developed the confidence in and reliance on their geographic information systems (GIS) sewer database where it is now the first point of inquiry on information related to the sewer system. As it is currently configured the system consists of nearly 120,000 pipeline and manhole assets that convey flow through a network of pipes approximately 2,094 miles in length. The County has a high level of confidence in the network of mainline pipes and manholes so it stands to reason that additional information would be required to continue the integration of GIS into daily engineering, and operation and maintenance activities. This natural progression and improvement has led to the inclusion of public and some private lateral pipelines, tap connections, wyes, backflow preventers, and cleanouts into the GIS database. Adding these features has added over 800,000 new records into the database, which will increase the network by nearly 400%. This new lateral information will facilitate engineering and maintenance work by creating a unique ID for each lateral and node feature identified by the County. Once a unique ID is established field stall will be able to readily locate assets in the field, expedite the work order process, and attach links to plumbing cards and condition assessment data. This presentation will identify the additional database features, provide information on the use cases and business rules used in developing the data, describe the process used to create the data from a NASSCO PACP database, and detail the maintenance implications for the new lateral data.

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202 * Thursday, August 29th, 2019 * 5:00:00 PM
Robert Kralli9nger, Stantec
How to Score when Planning Your Capital Program Projects

Speaker Bio: Bob has over 32 years of experience in the planning and design of water and wastewater treatment and distribution systems. He has a BS degree in Civil Engineering from Penn State and a masters from Virginia Tech. He has spent his career working with municipal agencies in the DC metropolitan area.

Abstract: With many jurisdictions having tighter scrutiny over their capital spending in the water and sewer utility systems, it increasingly imperative that capital improvement projects are carefully and consistently evaluated to document and rank their anticipated value. A major jurisdiction in Virginia has taken an initiative to develop a robust and repeatable process to achieve this objective. A matrix of performance criteria was developed so that attributes for each project can be documented in detail and the quantitative and qualitative benefits can be documented for each project. The three primary aspects that will be reviewed are as follows: 1. A CIP planning process including: - Project Planning Pathways – A process to move projects from initial identification through final review - Project Prioritization Process - A process going through project scoring an ultimately ranking in a priority list 2. Project Business Case templates: - Business Case Templates designed to justify project investments 3. Decision criteria and associated scoring scales: - A matrix of quantitative or qualitative criteria that are used to score CIP projects Prior to full scale implementation, the agency performed a pilot test of the new system on select group of diverse CIP projects to evaluate how well it worked. The results and lessons learned from that process was very interesting and will be discussed in the presentation. The agency is also using a publicly available decision support software to facilitate real-time sorting and assessment of how the weighting factors for each scoring criteria affects the overall ranking of the portfolio of projects. This has now enabled a consistent and data driven process to rank and prioritize the CIP in the future.

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203 * Thursday, August 29th, 2019 * 5:00:00 PM
Patrick Dube, Water Environment Federation
From OIG to PFAS and beyond: Understanding the current state of biosolids

Speaker Bio: Patrick Dube, Ph.D., is a technical program manager for biosolids and odor control in the Water Science and Engineering Center at the Water Environment Federation (Alexandria, Va.). He received his Bachelor's and Doctorate from the University of Florida in Biological Engineering and his research expertise included anaerobic digestion and nutrient removal.

Abstract: Biosolids undergo a rigorous set of treatment processes that include physical, chemical, and biological processes to aid pathogen reduction. Utilities across the country have been safely recycling biosolids for decades while delivering innovative solutions that lead to stronger, more sustainable, and resilient communities. Even though biosolids efforts throughout the industry have been consistently supportive of science that backs that biosolids are a valuable resource, threats to biosolids continue to arise. The EPA's Office of Inspector General released a report claiming that the EPA is lacking in it's support of biosolids and that the agency does not have the tools necessary to carry out risk assessments of 352 unregulated pollutants found in biosolids. Shortly following that report, an anti-biosolids documentary was released to the public that claimed that biosolids are one of the largest threats to public health and the environment in recent memory. PFOA and PFAS have gained traction throughout the country as science has begun to link these compounds to possible negative health effects. These are just a few examples of issues that the biosolids industry has faced recently and although WEF and others support continued research on biosolids to ensure regulatory requirements continue to be based on the latest science, mroe must be done to inform the public and ensure that these issues do not harm the industry. This presentation will address the current state of biosolids, where the future lies, and techniques that can be applied to ensure that biosolids continue to be promoted and utilized to help meet resource recovery goals.

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204 * Thursday, August 29th, 2019 * 5:00:00 PM

Garrett Hughes, Dewberry Engineers Inc.

Lessons Learned from Urban On-Call Emergency Water Main Repairs

Speaker Bio: Mr. Hughes is a professional engineer registered in the state of Maryland, he has a masters degree in Environmental Engineering and has been working in the water/wastewater industry for over 7 years. As a consultant serving the City of Baltimore, he provides engineering expertise in the practice areas of management , design, and on-call engineering and emergency response for water distribution infrastructure.

Abstract: Lessons Learned from Urban On-Call Emergency Water Main Repairs utilizing case studies from on-call emergency water main repair work for Baltimore City DPW, this paper investigates root causes of and solutions to a variety of challenging water main breaks in dense, urban environments. Two examples of repairs performed along Howard Street demonstrate the value of considering future shutdown operations during the design phase of rehabilitation projects. A response to a sinkhole on McComas Street caused by a failed 42” storm drain and replacement of a broken 12” blow-off valve on a 72” transmission main in Hanlon Park are used to demonstrate the value of paying attention to proximal assets and field conditions while developing repair responses where factors such as latent flow in gravity pipes and ground water tables can affect decision-making. Case studies on two slope failures on Falls Road and Fort Ave. are used to demonstrate the need for rapid response to water main breaks in critical areas and showcase unique solutions for temporary slope stabilizing so that emergency repairs can be performed expeditiously. The case studies also demonstrate the multiple benefits that can be attained through close coordination with other utilities to resolve abnormal repairs

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205 * Thursday, August 29th, 2019 * 5:00:00 PM

Anthony Laufik, Greeley and Hansen

Reaching Across the Aisle to Address Basement Backups and Street Flooding in our Nation's Capital

Speaker Bio: Anthony has worked for Greeley and Hansen for over 12 years in the Washington, DC office. He has experience working on the DC Clean Rivers project and various DC Water program management contracts. He also has worked on WSSC program management and design contracts as well as AlexRenew developer reviews and utility tunnel design. He has an undergraduate degree in Civil Engineering from Purdue University.

Abstract: Similar to older cities around the United States, a large portion of Washington, DC is served by combined sewers that experience capacity constraints during significant storm events. DC Water received complaints from around the District including basement backups and street flooding during significant wet weather events. A flooding investigation team consisting of engineering, public relations, risk management, and sewer services were assembled to investigate the reported issues and determine the possible causes and mitigation measures. For each neighborhood that reported basement backup and/or flooding issues, the investigation team would research work order history, perform a hydraulic assessment on the nearby sewers, run the hydraulic model, conduct a site visit with a DC Water contract plumber, and perform sewer cleaning, inspections, and dye testing as needed. Properties located in the combined sewer service area were also evaluated for participation in the backwater valve program which provides a rebate for eligible residents having a valve installed to help prevent basement backups. The investigation team also collaborated with other District agencies like the District Department of Transportation (DDOT) and the Department of Energy and Environment (DOEE) and attended several public meetings in areas that were historically prone to flooding issues. DDOT was engaged for areas that experienced street flooding as they have jurisdiction over roadways and catch basin installation. DOEE was engaged for areas where erosion on private properties resulted in sediment buildup that limited catch basin capacity and exacerbated street flooding. The public meetings were typically organized by local Advisory Neighborhoods Commissions and focused on community flooding issues. Over the course of the last two years, the investigation team learned valuable lessons in evaluating root causes of basement backups and street flooding and educating the public and other city agencies to help mitigate future flooding.

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206 * Thursday, August 29th, 2019 * 5:00:00 PM

Nicolle Boulay, Stantec

Using Zeta Potential to Achieve Optimum Water Treatment Performance

Speaker Bio: Nicolle Boulay is the DC Area Water Business Sector Leader for Stantec. Nicolle has 20 years of experience as an engineer and manager for water and wastewater planning, design and construction projects. She is a registered engineer in the State of Virginia and has a bachelor's degree in engineering from Bucknell University and a Master's of Science in Engineering Degree from Virginia Tech. Nicolle has served in various leadership positions for the local sections of AWWA and WEF and is currently the Chair of the Membership Committee for CSAWWA.

Abstract: Zeta Potential is an analytical measurement used to predict clarification and filtration performance at water treatment plants. Zeta potential is a measurement of the surface charge on a particle expressed in millivolts (mV) and it is measured by tracking the motion of charged particles in an electric field (electrophoretic mobility, EM.) Zeta potential depends on surface chemistry of the particles and the solution. Higher (less neutral) zeta potential yields more stable particles, better coagulation and more effective filtration. When optimizing filter operations, filtration plants typically rely on jar testing in conjunction with turbidity, TOC, UV254 absorbance and streaming current measurements to determine coagulant selection and dosing. Often, though, this approach does not translate to optimal full-scale operations as expected. Taking advantage of a zeta potential instrument allows for direct measurement of particle charge in treated water, providing results that enable reliable, scalable coagulation chemical and dosing selection. This presentation will explain the theory behind zeta potential and present the device that is used to measure it. Coagulation chemistry will be reviewed to help explain why zeta potential can help to optimize chemical dosing, including possible supplemental polymer usage, and treatment efficiency. Several case studies will be presented from water treatment facilities where zeta potential was used to select coagulant dose and optimized pH. Resultant filtration performance will be shown graphically. Finally, the practical implications of using zeta potential at water treatment plants including cost and implementation will be discussed and summarized.

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201 * Friday, August 30th, 2019 * 8:30:00 AM

Kathleen Zynda, GHD

How to Eat an Elephant...a Phased Approach to Implementing an Asset Management Plan - Napa Sanitation, Napa, CA

Speaker Bio: Kathleen has 18 years of experience that combines her backgrounds in GIS, education, and the implementation of Enterprise Asset Management Systems, including Lucity, Cityworks, and Infor EAM. She has performed software needs assessments; performed data collection and standardization; led business process workshops; performed software configurations; and developed custom training materials. Kathleen holds a Bachelor's degree in Geography from the State University of New York College at Geneseo, and a Master's degree in Geography State University of New York at Buffalo

Abstract: The Napa Sanitation District (NapaSan) is located in the Napa Valley in Northern California and provides wastewater collection (approximately 37,000 connections), wastewater treatment (dry weather flow 6MGD), recycled water distribution, and biosolids management services to the residents and businesses in the City of Napa and surrounding unincorporated areas of Napa County. NapaSan has been serving the public since being organized as an independent special district in November 1945 under the California Health and Safety Code. NapaSan has recognized the importance of using asset management as a practice to minimize the total cost of owning and operating their assets, while considering service levels and risk. NapaSan has developed a Strategic Roadmap and Asset Management Plan (SAMP) that has become part of its on-going business practice. Developing the SAMP served to achieve several District objectives: 1) The SAMP serves as a guiding document ("roadmap" or "checklist") for implementing an asset management (AM) framework; 2) The AM framework is concise and addresses collection system operations and maintenance, treatment plant operations and maintenance, and capital planning needs; 3) The SAMP serves as a business case for implementing an asset management program; and, 4) The development of the roadmap has assisted in getting District staff on the same page and heading in the same direction. The implementation plan and roadmap were based on NapaSan staff leading the implementation with appropriate coaching, guidance and technical support as needed. This presentation discusses NapaSan's 2017-2019 Strategic Plan for Asset Management, the goals, and how the Plan was structured in manageable phases. The presentation will explore NapaSan's experiences with core foundations on creating an Asset Management position, selecting an experienced consultant team to evaluate the baseline, assemble an Asset Management team, and select, procure and implement a new EAM software solution. Of critical importance, NapaSan shares their experience on how the roadmap and phasing allows organizations to plan and budget for the future phases. This framework has flexibility that can be harnessed by any organization.

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202 * Friday, August 30th, 2019 * 8:30:00 AM

Michael Mulcare, Mott MacDonald

What it Really Takes to Implement Remote Water Quality Monitoring

Speaker Bio: Mike is Mott MacDonald's Smart Infrastructure Leader based in Arlington, VA. Using a systems thinking approach to smart water infrastructure, his work focuses on integration of sensory technology, communications infrastructure, data management and analytics tools, and enterprise systems to enable effective system management. Mike has a Bachelor of Electrical Engineering from Georgia Tech, and Master of Arts in Finance from Harvard University, and an Master of Business Administration from MIT.

Abstract: Control of water quality is critical to the customer safety and has historically been monitored through a combination of on-line sensors at treatment plants and laboratory testing of samples from the distribution system. DC Water, under the Water System Sensor Program (WaSSP) has undertaken installation of numerous sensors in its water distribution network as part of a smart infrastructure journey to improve system operations and water quality. This presentation will discuss planning and implementation of remote water quality monitoring stations to improve understanding of residual chlorine concentrations in different pressure zones. Monitoring water quality in water distribution systems is an important evolutionary step in smart infrastructure development to improve system understanding, customer safety, and operational efficiency. Moreover, through the insight these sensors provide when coupled with modeling and analytics, system design and operations can be shaped to improve regulatory compliance and increase system resilience. However, adapting technology designed to be installed at a treatment plant for remote installation entails hurdles that can slow progress and lower performance. Because of the importance of disinfectant residual, this program focused on total chlorine concentration measurement as well as ORP as a potential surrogate. This presentation will walk through the process from project inception through implementation and operations. Selecting sites and addressing the legal requirements is a first hurdle that can quickly lead to program delays. System design presents more challenges including what sensors will be used, how and what information the equipment will communicate, and what features are needed to enhance robustness for installation at someone else's facility. Different options considered will be discussed as well as details on the final design. During equipment testing some new issues were identified that drove further design updates. These issues, the applied solutions, and operating experience with these systems is discussed. Data management and security considerations will also be discussed. The presentation will conclude with discussion on the future vision for these remote sensors including integration into real-time modeling. Design considerations to ensure flexibility for integration of new technology is included.

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203 * Friday, August 30th, 2019 * 8:30:00 AM

Michele Braas, Xylem, Inc.

Saving Energy and Money through Better Wastewater Treatment Plant Mixing

Speaker Bio: Ms. Braas is an Environmental Engineer with Xylem's Flygt Mixer Group. While she currently focuses on mixers and mixing applications, she has more than 20 years of experience in designing wastewater and drinking water systems. Her work has included performance and design of BNR evaluations.

Abstract: In the past, mixers have been given little consideration in the grand design of wastewater facilities. Mixers were designed for worst case scenarios, whether flow or loading, and very little other thought was given. With an increased focus on energy management and optimization, mixers present an opportunity for both optimized treatment and energy savings. Many engineers and operators have come to recognize that overmixing in order to cover the worst case scenario not only wastes energy, but provides sub-optimal process results. Flygt has been conducting a number of adaptive mixing pilot projects around North America. The purpose of the pilot studies was to determine the actual energy needed to provide mixing and the amount of energy savings that can be seen when mixers are "turned down". The studies took into consideration the effectiveness of mixing as determined by TSS levels, along with power required to maintain a completely mixed tank. For this talk we will focus on several studies. The first where larger mixers were able to be replaced with smaller mixers, saving more the $100,000 in annual energy costs. The other studies focus on the use of a variable speed mixer and the energy needed to maintain complete mixing within a treatment tank. In these studies, the operators took TSS measurements throughout the mixed tanks to determine whether or not adequate mixing was being provided. It was discovered that over 150,000 gallon tank could be mixed with 0.22 horsepower. In addition to the studies, the basics on mixing will be presented. We will discuss mixing applications, the measurement and importance of thrust, and the measurement and magnitude of energy requirements for mixing. We will wrap up the presentation by sharing with the audience a process that they can use to perform a desktop study to determine if there mixers may be oversized and/or if varying the speed of their mixers could save them energy.

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Jason Garz, Mott MacDonald

Cranking up the pressure in DC - Lessons learned from starting up a new pressure zone in DC

Speaker Bio: Jason Garz is a Principal Project Manager for Mott MacDonald and holds Bachelor and Master of Civil Engineering degrees from Auburn University. He has over 24 years of engineering experience in the analysis, design and permitting of water, wastewater and stormwater projects. Since 2015, he has been working with the Water Program Management team for DC Water helping to manage their multi-million dollar Capital Improvement Program.

Abstract: DC Water began the planning process to implement a ninth zone in their water distribution system 20 years ago and invested $100M on projects to improve system pressures for 6,000 customers. As the date for the 2018 commissioning of the zone approached, a detailed commissioning plan was developed to engage stakeholders, manage roles and responsibilities, establish lines of communication, and identify potential gaps in coordination. The plan included a gradual pressure ramp up (maximum 2 psi/day) to achieve the 22-psi total increase within the new zone. The increase was achieved through pump station spill headers which allowed for spilling from the adjacent pressure zone. Daily coordination calls were held with stakeholders from pumping operations, engineering, water services, water quality and contractors to review the safe clearance plan for that day's actions, trouble-shoot issues, review latest system and pipe break data and gain concurrence from the group before proceeding with the next pressure increase step. During the process, the schedule went through several minor revisions balancing two conflicting goals: 1) To increase the pressure gradually to minimize system impact; 2) To increase the pressure as quickly as possible in the process to provide storage volume should a major pipe break or spill header operational issue occur. Once the increase was completed, manual operation transitioned to automatic operation using the new tank and the dedicated pumps for the new zone. While DC Water had replaced 15 miles of water mains to prepare for the pressure increase, during the four-week pressure increase period, 19 pipe breaks occurred and a total of 40 pipe breaks occurred within two months of the start of the increase. In one location there were five pipe breaks on the same 300-ft section of pipe over an eight-day period. On the other hand, DC Water installed nearly 1,000 residential pressure reducing valves and to date has not received any reports of broken plumbing within residences following the start of the pressure increase. DC Water installed two different types of remote pressure sensors within the distribution system which were utilized to monitor near real-time reaction in the system during the pressure increase and immediately after each step in the pressure increase, as well as immediately after pipe breaks over a 4-month period. Data from the remote sensors was used throughout the process to help monitor the pressure ramp-up and trouble-shoot issues. DC Water SCADA data was also utilized to monitor the system during the pressure ramp-up. SCADA and pressure sensor data revealed that while the spill headers were an effective tool for gradually stepping up the pressure, they did not provide precise control and as a result the daily adjustment to the spill header settings required some degree of trial and error approach to achieve the desired change.

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Eyasu Yilma, DC Water
Long Term Corrosion Prevention Program

Speaker Bio: Eyasu Yilma is a professional Engineer registered in District of Columbia. He is a graduate from universities in Ethiopia, and Germany, with masters degree in Water Resources Management. He has more than 24 years of consulting and management experience. He has been working for DC Water for the last 10 years as a consultant, and manager of one of the most critical collection system, the Potomac Interceptor. He has authored several documents including Multi-Jurisdictional Use Facilities cost share, and the Renewal of Potomac Interceptor.

Abstract: The PI conveys approximately 56 million gallons per day (MGD) of gravity-fed flow from several service areas of Washington DC's suburbs, starting near Dulles Airport. It extends along the Potomac River to the Potomac Pumping Station (see the overview map in Appendix A). Flow is then pumped to the Advanced Wastewater Treatment Facility located at Blue Plains in the District of Columbia (District). Several jurisdictions discharge into the PI system including portions of Fairfax and Loudoun Counties, the towns of Vienna and Herndon, in addition to Dulles Airport, in Virginia, and parts of Montgomery County in Maryland. The PI is primarily composed of reinforced concrete pipe (RCP) with only two segments of polyethylene pipe. It is one of the single largest assets within the DC Water sewer system. Most of the Potomac Interceptor (PI) Sewer has been attacked by H2S gas, and close to 95% of its physical extent shows some signs of defects—primarily loss of wall thickness and other structural damages. DC Water develops a capital improvement project (CIP) when the structural integrity of pipe segments is compromised. DC Water has certain limitations to implementing its CIP projects. These projects are sometimes located on National Park Service (NPS) property, regional parks, and private properties. Most PI pipe segments are more than 1,000-ft long and require expensive bypass operations to rehabilitate. Rehabilitation of pipe segments including bypass pumping is very expensive and requires long lead times. Because of these formidable CIP project limitations, it is imperative to work on preventative measures to avoid risk of failure that might occur due to the protracted process of CIP project implementation, possibly saving the cost of replacement of an asset. Given the complexity and extent of the PI, it is not practical or fiscally responsible to rehabilitate or replace every segment of it in response to identification of a defect. The challenge faced by DC Water is to determine which defects and which severity of defect merit rehabilitation or a change in operating and maintenance procedures in a manner that is fiscally responsible while protecting the health and safety of the public. Projects identified under the LTCPP are ones that will prevent corrosion progress in a manner that provides the greatest benefits in terms of long-term investment. They are intended to avoid over investment or under investment in the life-cycle of pipe segments. Projects will be identified to provide short-term solutions when CIP projects could not be implemented in a short period for technical or financial reasons, Removal of biofilms, Venting or off-gassing, Liquid phase treatment Pipe retrofit, Point repair, Sacrificial concrete This paper discusses the process of identification of tasks or projects that will contribute significantly in slowing down or preventing pipe deterioration caused by corrosion, and how long-term corrosion prevention measures implemented. DC Water developed Sewer Processing model to be used to as an input for the business case evaluation to prioritize tasks based on the long-term benefits. This paper will include presentation of the WATS model result.

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201 * Friday, August 30th, 2019 * 9:00:00 AM

John Van Ness, Baltimore County DPW, Bureau of Utilities

Challenges of Developing a Sewage Pump Station Asset Inventory Program

Speaker Bio: John Van Ness came to the wastewater field from a background in Public Safety and Outdoor Education where he served in such diverse roles as a Rescue Diver and Canine search and rescue specialist. John started at the Baltimore County DPW Bureau of Utilities in 1999 and became an Engineering Associate in 2004. In 2005 Baltimore County entered into a consent decree with the EPA, giving John a unique perspective of the evolution and progression of the consent decree implementation.

Abstract: Beginning in 2005, Baltimore County (County) developed a GIS-based sewage pump asset inventory and work order system that included 117 pump stations and one wastewater treatment plant. The inventory was develop and is maintained to track planed and completed work and equipment resources used at each pump station/treatment plant. By definition, the asset inventory is a record of the owned resources; however, what are the assets of a pump station? Is a pump station considered an asset or, perhaps the each piece of pump station equipment is considered an asset? What are the critical pump station assets that should be tracked in the inventory and what work information should be tracked for that equipment? The purpose of the asset inventory was/is to query data to drive future operational and/or improvement decisions. The initial inventory included over 7,000 separate assets; however, based on lessons learned since 2005, the County is dramatically simplifying the inventory. This presentation will discuss the inventory development process, the importance of a solid overall framework and lessons learned to limit data recording so as to avoid overwhelming data analyses. The presentation will also discuss how to identify what parts of an asset inventory are a benefit or liability and lessons learned and practical guidance of successful and unsuccessful inventory schemas/workflow processes.

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Timothy Taber, Barton & Loguidice, DPC

Addressing America's Water Infrastructure Act of 2018 with Asset Management Tools

Speaker Bio: Mr. Taber is the Asset Management Discipline leader for Barton & Loguidice and has extensive experience in the planning, design, and construction of infrastructure and asset management projects. He has 23 years of experience working on civil engineering projects, and now focuses on planning, developing, and implementing GIS and asset management programs and working with organizations to improve their operations and management of their assets. He has worked with municipalities of all sizes across the US on innovative projects that address challenging issues.

Abstract: On October 23, 2018, America's Water Infrastructure Act (AWIA) was signed into law. The law requires community (drinking) water systems serving more than 3,300 people to develop or update risk assessments and emergency response plans (ERPs). The law includes components that the risk assessments and ERPs must address, and establishes deadlines by which water systems must certify to EPA completion of the risk assessment and ERP. In 2016 the Onondaga County Water Authority (OCWA) reviewed two different tools (EPA's VSAT and NIST Cybersecurity Framework) as well as the AWWA J100 standard to begin their preparation to comply with this new law. Over the past 2-years, OCWA has developed a unique approach to managing all the required data for conducting the vulnerability assessment by integrating it into their existing asset and work management system, Maximo. At OCWA the Maximo system is also utilized for project management, inventory control, and tightly integrated with the financial management system, so conducting the vulnerability assessments in Maximo has many benefits including: 1. A single system to track all asset data, risk, and vulnerabilities 2. Detailed tracking of all follow-up activities identified in the vulnerability valuations 3. Comprehensive cost tracking of implementing countermeasures and other activities to reduce risk 4. Full prioritization and scheduling abilities for follow-up work 5. Putting all information into a single database so that multiple data sources do not need to be managed and synchronized The approach OCWA is taking to implement their Vulnerability Assessment is briefly described below: 1. Inventory each site / facility owned and operated by OCWA. These sites were already identified in the Maximo system. 2. For each site, review the RAMCAP reference threats and establish: a. Consequence resulting from the destruction or loss of the asset. These scores are stored in Maximo and consider: i. Potential for Fatalities ii. Serious Injuries iii. Major Economic Losses to OCWA or the Community it Serves iv. Impacts to the Environment Loss of Public Confidence v. Size of Service Area b. Likelihood of threat, a score that indicates how likely a particular threat is to a site and is also stored in Maximo. c. Risk and resilience analysis which evaluates each site for countermeasures and other resiliency measures to protect against various threats. These evaluations are conducted in the field and data is entered directly in Maximo. For any resiliency or countermeasure that is assessed non-existent or in unserviceable condition, a follow-up work order is immediately created to address the issue. Maximo is also used to assess the effectiveness of each countermeasure to protect against a particular threat. d. After all scores are entered into Maximo and the site analysis is conducted, algorithms in Maximo automatically determine the highest risk vulnerabilities for each threat / site combination. This presentation will outline the approach and results of OCWA's implementation of their custom tool.

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203 * Friday, August 30th, 2019 * 9:00:00 AM

Paul Petersen, Atlas Copco Compressors

Case study of blending blowers for optimum efficiency

Speaker Bio: Paul has 8 years of experience with rotating equipment in the wastewater treatment industry. His experience includes applications engineering, contract execution, and sales in industrial and municipal sectors. He has been published multiple times on the topic of blower performance optimization. Paul has a bachelor's degree in Mechanical Engineering Technology from UNC Charlotte. He is also a graduate of Lee College of Engineering Leadership Academy. Paul currently resides in Charlotte, North Carolina.

Abstract: The knowledge gained from the aeration system at Letchworth, UK shows that significant advantages in capital cost, system efficiency, and DO control can be realized by implementing design techniques that have utilized for decades outside of the municipal wastewater industry. The concept of blended technologies has been widely accepted in the industrial compressed air business since the 1990s. The principle of the design is to optimize the efficiency of an entire air system by using both centrifugal and positive displacement technologies. Optimizing a blended technology air system requires constant operation of centrifugal machines at their most efficient design point, while utilizing the full turndown of the positive displacement machines to handle variations in the air demand. This approach to system design can been seen in compressed air systems of some of the world's largest and most profitable companies. Some may ask why the same approach has not been used for aeration blower system design. The answer is that most blower companies only manufacture one compression type or the other. However, some companies offer both centrifugal and positive displacement technologies and have been able to successfully offer blended blower systems for optimum aeration efficiency. The wastewater treatment plant in Letchworth, United Kingdom, has been operating a blended blower aeration system for several years now. The blower system consists of one magnetic bearing high-speed turbo blower plus three rotary screw blowers. The turbo blower runs continuously, handling the base-load of the aeration DO demand. This allows the centrifugal turbo machine to operate a peak efficiency and avoid surge conditions. The rotary screw blowers handle the additional DO demand caused by the diurnal load. The 5 to 1 turndown of the rotary screw blowers means one blower can typically handle the peak daily flow of this plant. In cases of storm surge or other unusually high plant loads, a second rotary screw blower will be brought online to satisfy the additional air demand of the aeration system. In the unlikely event that the magnetic bearing turbo blower is down for service, the three rotary screw blowers can handle the peak design flow of this plant. The blended blower system design provided the Letchworth, UK plant with lower capital cost, superior turndown, and greater aeration system efficiency than any traditional single blower technology could have achieved. The capital cost to purchase four magnetic bearing turbo blowers would have been approximately 28% higher than the cost of the existing system. The turndown of blended blower system is 52% greater than an all turbo system. Due to the improved efficiency of the screw blower at low flow rates, the blower system efficiency is nearly 50% greater at minimum design flow. Turbo blower efficiency in a blended system is 14% lower than in an all turbo blower system. In summary, designing aeration systems with blended blower technologies can lower capital cost, improve process control, and provide lower plant operating costs when compared to using any single blower technology.

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204 * Friday, August 30th, 2019 * 9:00:00 AM

Aman Tuteja, Arcadis

Streamlining System Analysis Through Optimization - Integration of Hydraulic and Optimization Models

Speaker Bio: Mr. Tuteja is one of Acradis leading experts in hydraulic water distribution system modeling. He has worked directly for utilities such as DC Water and Arlington County from which he acquired a variety of experience working closely with different departments. Prior to that, he gained consulting experience while working on projects related to various municipalities in the DC/Metro Area. Through ten years of total experience, he has worked on projects such as master planning for water and sewer, pipe criticality analyses,and meter infrastructure assessment for AMI implementation.

Abstract: Washington Suburban Sanitary Commission (WSSC) supplies water to a population of approximately 1.8 million customers, with an average daily demand of 165 million gallons per day. WSSC's complex network of roughly 5,500 miles of pipeline and other water related infrastructure requires advanced planning strategies. WSSC's continuous infrastructure improvement planning ensures reliable service to its customers. As part of this effort, Arcadis, WSSC, and Optimatics are conducting an optimization evaluation to determine how to increase operational efficiency for an area supplied by multiple sources within the water system. WSSC is comprised of 85 pressure zones. The 560A-Zone, the focus of analysis for this project, spans 96 miles and receives water produced from water filtration plants via 12 pressure reducing valves (PRVs). The objective of this project is to increase operational efficiency by selecting the optimal number and setting for PRVs, therefore potentially reducing the number of PRVs in operation, as the maintenance can be costly and labor intensive. From the all-pipes model of the WSSC water system, a stand-alone hydraulic model (WaterGEMS) is created and linked to an optimization model (Optimizer-WDS). The model is formulated to consider benefits of optimal PRV settings and operations, new infrastructure such as new pipes and elevated tanks, and water age reduction upstream of the supplying PRVs. The results are automated through the multi-scenario analysis process. Scenarios are evaluated and compared on the basis of cost by applying financial penalties and incentives tied to levels of service, subsequently, verified for sustainability. Having the results of all scenarios on one platform, planners and engineers are able to focus on effective results and avoid the traditional trial and error process. The findings of the pilot project could prove useful for other utilities looking to identify the most optimal and cost-effective solutions of supplying water within their systems.

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Carl Rios, JMT
Delaware's Next Top (Hydraulic) Model

Speaker Bio: Mr. Rios is a Professional Engineer who graduated from Virginia Tech in 2012 with a BS in Civil Engineering and has been with his current engineering firm, JMT, since 2015. Mr. Rios primarily works on sanitary sewer and water rehabilitation projects while specializing in hydraulic modeling including the modeling of sanitary sewer collection, potable water distribution, and occasionally storm water conveyance systems.

Abstract: The Christina River Force Main (CRFM) is a 7-mile long, low-pressure, large diameter (36”-84”) sanitary sewer force main that services a majority of the northern half of New Castle County, Delaware (NCC). This Force Main carries 40 million gallons of sewage per day and discharges to the Wilmington Wastewater Treatment Plant (WWTP). The CRFM is unique among sanitary sewer systems in that the only direct source of flow and pressure in the force main comes from five (5) surge ranks that discharge into the CRFM at various locations along its alignment. These surge tanks are filled directly by individual pump stations which collect the sewage from upstream sewer basins and functions in a manner that bears resemblance to the operation of a water tower. Following a series of emergency repairs which raised concerns about the condition of the CRFM, NCC contracted JMT to develop a long-term inspection, rehabilitation, and system redundancy plan. In order to efficiently and cost-effectively make recommendations on alignments for a redundant force main, JMT looked to build a hydraulic model that could accurately simulate existing conditions and ensure that proposed solutions would not negatively impact the existing level of service. However, the unconventional design of the CRFM rendered traditional sewer modeling software ineffective. In order to accurately simulate the CRFM and any proposed solutions, JMT utilized the water modeling software WaterGEMS in an innovative approach to sewer modeling. JMT had to determine how to translate sanitary sewer system demands, wet weather flows, and sewer pump station infrastructure into a software designed for closed water systems. JMT developed a hydraulic model that recreates the conditions found in the existing CRFM to evaluate several potential alignments. A major design consideration for the proposed alignments was that the existing pumps and pump stations were to remain in service. Therefore, JMT had to ensure that the existing pump station configuration and pump capacity were accurately simulated in the model. The primary goals for this model were: To accurately simulate the conditions inside the existing CRFM with special consideration given to system flows, pressures, and accurately modeling the capacity of the existing pumps/pump stations. To build and evaluate several proposed alignments for a proposed redundant force main. And to evaluate the effects that the proposed alignments have on total system headloss, pump/pump station capacity, the number of pump station cycles/cycle times, force main velocities, wet weather capacity, and flow volume sent to the WWTP. This presentation will provide a discussion of the initial system analysis, why WaterGEMS was chosen over more traditional sewer modeling software, the sewer model development & calibration, and how the sanitary sewer system flow and operational data was translated into WaterGEMS. A discussion of how the model was utilized during the alternatives analysis and the findings of the alternative scenarios will be provided. The presentation will also discuss the challenges faced while building the hydraulic model, using a software outside of its intended use, and the lessons learned over the course of the project.

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201 * Friday, August 30th, 2019 * 9:30:00 AM

Golnaz Khorsha, PhD, Baltimore City Department of Public Works

Implementing and Challenges involved in conducting AWWA Water Audit

Speaker Bio: I have been working as an engineer with Baltimore City DPW since 2017. I have a background in chemical engineering, with my graduate education focusing on addressing sustainability and environmental engineering, particularly specific to stormwater mitigation strategies, and water distribution system monitoring/auditing.

Abstract: Baltimore City has historically measured its water-footprint in terms of “Accounted and Unaccounted-for-Water”. In the past few years, however, the Office of Asset Management within Baltimore City DPW has been implementing AWWA water audit to produce a systematic and standardized approach for the flow of water within Baltimore City's water distribution system. This worked aimed to conduct the AWWA water audit in conjunction with localized analyses of water production, distribution, and losses, to achieve a systematic and standardized performance-measure in order to mitigate losses and amend emergency preparedness in the utility. The first attempt in conducting the AWWA water audit in 2012 resulted in imprecise accounting of production and losses, with the KPIs not meeting the minimum AWWA standards. Nevertheless, with detailed mapping and comprehensive tracking of city assets, significant improvements in data reliability have been made. A reliable baseline using the Infrastructure Leakage Index (ILI) is now available, and a detailed utility-specific methodology is developed for calculating apparent and real losses. Additionally, accounting for “authorized-non-revenue” water via different proactive programs is evolving to further increase accuracy in calculation of the City's water budget. To calculate apparent losses, historical consumption trends for different meter groups were complemented with recent upgrades in the AMI/AMR system. A subsequent framework was established to target and minimize causes of apparent loss. The audit also demonstrated that real losses compromise the greatest degree of inefficiency in the City, particularly during extreme weather patterns. A model was developed to correlate main break and water losses with temporal effects. This can be used to prioritize resources for emergency preparedness and improve response time. Moreover, the City has reviewed water losses on a localized level, enabling the City to identify areas of concern, and establish a protocol to target and resolve leaks proactively. The lessons learned have been utilized to not only understand the greatest problem areas within the water distribution system, but to engage in proactive steps to improve efficiency and minimize loss.

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202 * Friday, August 30th, 2019 * 9:30:00 AM

Aditya Ramamurthy, Hazen and Sawyer

OF THE PEOPLE, BY THE PEOPLE, FOR THE PEOPLE – DATA DEMOCRATIZATION AT NEWPORT NEWS WATERWORKS

Speaker Bio: Mr. Ramamurthy is a senior associate and mid-atlantic region asset management lead at Hazen and Sawyer. He has over 19 years of experience driving multiple programs for water and wastewater clients. Mr. Ramamurthy's utility management focus areas include asset management, data governance and information management, business process optimization and program management. Mr. Ramamurthy has a MS in Civil Engineering, and an MBA in Operations Management.

Abstract: The democratization of data is one of the most powerful ideas to come out of data science. Everyone in an organization should have access to as much data as legally possible. Through the implementation of an asset management program initiatives, Waterworks has enabled a process that provides access to a variety of data to engineers and operations and maintenance (O&M) staff; data that was previously available but inaccessible to most staff. This presentation will describe in detail Waterworks approach to convert data into meaningful information and make it available for staff use and decision making. Two key asset management initiatives that is contributing to this process at Waterworks will be described and discussed as part of this presentation: Condition Assessment and Risk Data of Pump Stations - Waterworks leveraged mobile devices to collect condition assessment information of over 1,000 raw water and finished water pump stations assets. Subsequently, Waterworks leveraged Microsoft PowerBI to develop multiple dashboards that converted raw condition data into meaningful insights. Capital Improvement Program (CIP) Planning - Waterworks has implemented an integrated business case evaluation-focused capital planning and prioritization process throughout the organization. As part of this effort, Waterworks leveraged CIP Planning dataset to develop dashboards that are intended to not just track the inventory of existing CIP projects, but also information such as funding needs, project manager assignments, etc. that will enable Waterworks to optimize the CIP Planning process. With technology becoming ubiquitous, Waterworks is already beginning to see the following benefits: Minimize manual redundant calculations and computations Leverage varied but related datasets to enable effective decision making Minimize the use of excel based tools and optimized communication Enabled a single source for information sharing and use Leveraged technology that aligns with organizational needs

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203 * Friday, August 30th, 2019 * 9:30:00 AM

Jason Calhoun, Nuvoda US

A case study on the Moorefield Wastewater Treatment Plant system upgrade with the MOB™ process

Speaker Bio: -

Abstract: In 2013, a partnership between the Town of Moorefield, West Virginia and a local poultry factory resulted in the construction of the 6.2 MGD Advanced Nutrient Wastewater Treatment Plant (WWTP) to improve the region's discharge quality into the Chesapeake Bay Watershed. The state-of-the-art 5-stage biological treatment process currently treats a combination of industrial (90%) and municipal (10%) flow to meet the stringent discharge limits. Soon after start-up, the Moorefield WWTP encountered multiple issues caused by the waste flow from the poultry process. The variable industrial influent is high in nutrient concentration but low in BOD; this forced the WWTP to rely heavily on expensive chemicals to meet the discharge limits. Moreover, the sanitation chemicals from the industrial process caused several biological upsets in 2016, costing the Moorefield WWTP $200,000 to recover. Faced with high operation cost and unpredictable effluent quality, the Town of Moorefield WWTP underwent a process upgrade using Nuvoda's MOBTM (Mobile Organic Biofilm) Process in March 2017. The MOB™ process is a novel and sustainable wastewater treatment process to improve settleability, increase treatment capacity and improve process stability. This process utilizes a highly renewable lignocellulosic material harvested from Kenaf (Hibiscus cannabinus) as a substratum for biofilm growth. The adsorptive Kenaf with high surface area is machined to approximately 0.5 mm in size, allowing them to act as media for fixed film and granular sludge growth. This hybrid media adaptively grows a stratified microbial community that facilitates robust and simultaneous biological nutrient (C, N, P) removal, and is free to circulate into the secondary clarifiers to improve settleability. Comparing the data from April 2016 to February 2018, the Moorefield WWTP has seen 80% reduction in SRT, 87% reduction in SVI, 96% reduction in effluent TSS and no system upsets after the MOB™ process was installed. The successful upgrade with MOB™ has helped the Moorefield WWTP save at least 50% of total operation cost since March 2017.

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204 * Friday, August 30th, 2019 * 9:30:00 AM

Justin Kirk, Clark Construction Group, LLC

A Unique Solution to Flooding Removal in the CSX Howard Street Tunnel

Speaker Bio: Justin Kirk is currently a Project Manager for Clark Construction Group in their Civil division and has worked for Clark for 4 years. Justin graduated from the University of Delaware in 2009 with a Bachelor's of Civil Engineering degree and is a licensed Professional Engineer in the State of Maryland.

Abstract: The CSX Camden Street Storm Drain Replacement Project is a complex, technically challenging design-build project in downtown Baltimore, Maryland. The project is located steps away from Oriole Park at Camden Yards in an historic and heavily traveled section of Baltimore. The project consists of replacing a 48-inch-diameter brick storm drain built in the early 1890s that crosses directly under the CSX railroad tracks in the Howard Street Tunnel, in order to alleviate flooding caused by storm water flow breaching the modified portion of the historic storm drain inside the tunnel. A new storm drain siphon will allow for the future expansion of the CSX freight tunnel's vertical clearance to accommodate double stack intermodal rail cars. The project consists of a new subterranean storm drain pump station and three new storm drain tunnels: a 60" hand-mined tunnel for a 48" fiber-reinforced plastic (FRP) carrier pipe, a 48" hand-mined tunnel for an 18" PVC carrier pipe, and a 73.5" tunnel constructed using a micro-tunnel boring machine (MTBM) for a 60" FRP carrier pipe. The carrier pipes serve to divert storm water flow from the existing 48-inch-diameter storm drain to the new storm water pump station built in one of the project shafts and ultimately into an inverted siphon system that connects the new structures to the existing downstream storm drain system. The design-build team initially bid on bridging documents. Based on initial discussions with CSX, the design-build team was given a preliminary engineering contract to vet several options, including relocating the Camden Street Shaft and surveying the multitude of utilities that cross the site, to mitigate some of the more significant risks to the project. At the completion of the initial engineering phase the design-build team negotiated a final lump sum design-build contract to complete the engineering and deliver the storm reconstruction Project to CSX. The project is currently under construction with completion scheduled for early Spring 2019. This presentation will focus on the design-build team perspective from the initial feasibility study to project completion and the development of a buildable solution that successfully managed all of the major Project risks. The presentation will specifically touch on: the history of the 48-inch storm drain within the Howard Street Tunnel and the reason for CSX to move forward with the project; design considerations and challenges with respect to tunneling, shaft, and structure layout in a dense urban environment; maintaining flows in the storm system during reconstruction; construction considerations and challenges; and lessons learned.

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205 * Friday, August 30th, 2019 * 9:30:00 AM
Jennifer Steffens, EmNet, a Xylem Brand
Using Next Century Tech to Solve Last Century's Problems

Speaker Bio: Jennifer Steffens is a Client Solutions Manager at EmNet and a professional engineer. She has spent the past 14 years of her career working to resolve the challenges associated with water, wastewater, and stormwater systems. Today, she is focused on advancing the Intelligent Urban Watershed by applying new methodologies to maximize the existing capacity of assets and minimize the capital needs for the future. Thereby helping utilities realize the immense potential that often exists in their existing systems.

Abstract: Over the last few decades, hydraulic and hydrologic modelers have dramatically increased our understanding of urban watersheds. These models have been manually tuned and calibrated using data from flow meters and other sensors and adjusting available software knobs and levers to improve model accuracy, leading to better capital infrastructure planning. Additionally, substantive improvements to the various modeling software platforms in recent years have yielded improved results and a more compelling user experience. Recently, giant leaps forward in computing power, combined with advances and cost reductions in sensor and telemetry technologies, have made it possible to go far beyond the status quo and break into a new echelon of opportunities. We can now run high resolution models in real time, with real world precipitation data, while correcting critical downstream model nodes with observed sensor data. The outcome is perpetually calibrated digital copies of the urban watershed accessible in a web-based interface designed for operators that provides for far more effective real time operational decision making and control. The technological advances have enabled Real-Time Decision Support Systems (RT-DSS) that dynamically optimize collection system operations using a stream of data from sensors placed in the network, SCADA systems, and real time weather ensemble forecasts. In turn, the RT-DSS provides operational intelligence including: Active, automated and continuous monitoring of the sensor network; Real time collection system condition assessment identifying hydraulic anomalies including blockages and sediment; Operational guidance providing consistent actions across all shifts and continually updating to achieve defined objectives such as reducing energy consumption, minimizing overflows, and minimizing use of blending facilities based on actual conditions; Real time models infused with artificial intelligence and probabilistic weather forecasts to predict future outcomes in the collection system; Tools that allow operators to test operational decisions and perform forensic analysis of actual events with the model; and, Reporting of system key performance indicators. The RT-DSS platform unifies various data sources in real time, aggregates and mines the data with predictive analytic tools, and drives a real-time model of the sewershed. Rain gauge data, flow meter data, weather forecast data and other potential operations data drive a highly accurate, real-time model of the collection system. The output is actionable information provided to the operation staff, engineering, and leadership using web-based dashboards. Many utilities are facing daunting legal actions for sewer overflows resulting from rainwater overwhelming system capacity. The RT-DSS provides added benefit using the knowledge gained from the RT-DSS and coupling it with advanced control algorithms, utilities can realize capacity in existing assets that could not be achieved with traditional static controls and local reactive solutions that have been applied for decades. Extending globally coordinated control to future system improvements to reduce overflows has achieved up to 70% savings in future capital costs expenditures. This presentation will discuss the development and implementation of several RT-DSS for utilities across the country demonstrating the many benefits and describe how a utility may consider moving forward with an intelligent watershed management program.

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201 * Friday, August 30th, 2019 * 10:00:00 AM

Craig Benson, Mott MacDonald

Resiliency Planning for Water and Wastewater Utilities – Effective Preparation

Speaker Bio: Mr. Benson has over 26 years of civil engineering experience in the design and construction of municipal water and wastewater conveyance and treatment facilities. He has been actively involved in the development of master plans, emergency studies, emergency response plans as well as smart infrastructure projects. Mr. Benson has also developed operational guidelines and and support.

Abstract: The EPA has promulgated new regulations under the America's Water Infrastructure Act (AWIA) of 2018. The regulation stipulates that water systems servicing more than 3,300 people are required to assess the risks to, and resilience of, their systems to malevolent or natural acts. Certification of that effort must be submitted to the Administrator. In addition to the regulatory drivers, utilities should also recognize that weather patterns will continue to evolve with swings in wet and dry periods that will have an impact on supply and delivery. With these two drivers, resiliency planning is a critical endeavor for a water or wastewater utility. This presentation identifies four processes that can assist utilities with their resiliency investigations, and more importantly, their response to identified vulnerabilities. Too Critical to Fail Guidance Strategies – Review of utility assets in mind of a social aspects allow the utility to focus on what really matters. Dam failures, water delivery to critical customers, and sewage overflows, are examples of responses that should be evaluated in a way that limits the impact and identifies key vulnerabilities. Real Time Hydraulic and Water Quality Modeling – Using real time modeling, a utility can monitor items such as sewer overflows, large pressure disturbances, and system anomalies to provide early warnings. This has been used in Auckland to monitor beach water quality but could just as easily be used to monitor flood levels, basement backups, and severe rainfall events. Smart Infrastructure – Expanding access to remote sensors and water quality testing equipment is providing utilities more tools to perceive and measure what were historically unknowns within the networks. These enable water quality event detection, notification of abnormal operating conditions, and quantification of incidents such as system depressurization or flooding. With solar systems, low power communication networks, and inexpensive sensors, utilities can quickly deploy sensors where needed during weather events or permanently install them where needed to monitor critical assets. Machine learning – Application of machine learning techniques to system design and operational data can provide new insight into system limitations and potential failure modes. Coupled with integrated modeling tools, machine learning enables multiple system parameters to be analyzed concurrently to characterize multi-variate interactions that cannot be understood when evaluating a single parameter in isolation. This presentation explores these tools have been successfully employed to provide resiliency planning guidance others may consider. Because of the timing regarding the AWIA certification requirements, many utilities may have related questions.

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202 * Friday, August 30th, 2019 * 10:00:00 AM

Paul Sayan, Louis Berger

Have we gone too Far? Improving the Engineering Consultant Industry by Balancing Risk and Judgment

Speaker Bio: Paul is an associate vice president with Louis Berger and currently serves as program manager for Baltimore County's wastewater Consent Decree program. Paul has over 20 years experience in water/wastewater design and utility management. Paul has a bachelor of science degree in civil engineering from the California State University at Long Beach and a masters degree in environmental engineering from the Johns Hopkins University and is a registered professional engineer in Maryland and California.

Abstract: Some people may describe the typical engineering consultant as conservative, safe, and reasonable, none of which are bad qualities. Some may say those are desirable qualities, but when do those qualities become burdensome and/or effect our practical judgement? Do we realize how our technical recommendations may have the unknown and unintended consequence of spending millions in public funds to address potential or actual issues that may have little consequence to everyday life? Since the early 2000s, engineering consultants, on behalf of local municipalities, have been recommending miscellaneous structural repairs to wastewater collection systems. How many catastrophic failures have occurred on a sewer, manhole or pump station that has been repaired? Is that a reasonable goal? Would a failure have occurred if no work was completed and, if true, how much money has been spent to fix problems that may never have occurred? What if 10 percent of the repaired assets experienced a catastrophic failure? How many people would be affected and at what cost? Does the engineering consultant take these questions into account when developing a multimillion-dollar capital project? As part of the capital improvement program, Baltimore County (County) reviews and, in many cases, descopes improvement recommendations made by the various engineering consultants. In most cases, work is descoped based on engineering and/or operational judgment and risk. With asset management principles being so aligned with and fundamental to good engineering practice, shouldn't asset management principles such as probability and consequence of failure, be incorporated in the services offered to their clients? This presentation will discuss the County's transformation of the capital improvement planning processes to include these asset management principles. This presentation will discuss examples of descoped consultant recommendations and quantify the resulting potential costs and actual savings. We will also discuss the County's plans to validate past and current consultant recommendations and present portions of the County's asset management program, including the consequence of failure methodology and model, which will be incorporate into future County capital planning processes.

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203 * Friday, August 30th, 2019 * 10:00:00 AM
Robert Hindt, Little Patuxent Water Reclamation Plant
Be the Dog Not the Tail – Control the Process

Speaker Bio: Robert G. Hindt, P.E.; Mr Hindt earned his BS in Chemical Engineering from Tulane University and started working at a wastewater treatment plant as a Laboratory and Pretreatment Program Manager. He worked through the ranks spending 10 years as a project manager and 7 years leading a Technical Services Group responsible for process control, regulatory compliance and all capital projects. Leaving there after 24 years, he has spent the last 4 years as the Plant Manager at one of the best Water Reclamation Plants in Maryland, Little Patuxent Water Reclamation Plant.

Abstract: Process control is typically handled by one person, but what if that person is not available? What if they are out for an extended period of time? What if they retire? Howard County dealt with this situation for a couple years with various people filling in, but no one specifically trained to take control of the process. So a different approach was tried, the team approach. But who is on the team? How do they make decisions? Who is in charge? What are the rules? A process control meeting was developed along with a set of rules for the meeting and the decision making process. The team was developed to include all the key players in the plant operation. Next they needed to determine what information was important. How much data could be processed and what were the real goals of “Process Contrtol”. The road was a little rocky at first with power struggles, questioning hidden agendas, differing viewpoints and even a little of the typical “my kingdom” mentality. We’ll take you through the typical team building stages: forming, storming, norming and performing. On the back side the benefits are significant: everyone is better informed and has input, the process is better controlled, the goals are understood and drive the decisions and very importantly – the process does not rely on one person. The meetings became a teaching tool for less experienced staff and a breeding ground for new ideas.

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204 * Friday, August 30th, 2019 * 10:00:00 AM

Fernando Pasquel, Arcadis

Implementing Innovative Stormwater Capture and Infiltration for Groundwater Stabilization

Speaker Bio: Fernando is a Water Resources Manager with over 30 years of experience developing and implementing stormwater management programs that involve water quantity and quality modeling; policy analysis; and designing flood and stormwater controls / green infrastructure. Fernando has coauthored several stormwater and BMP/green infrastructure design manuals and has developed MS4/TMDL compliance plans. Fernando received B.S. and M.S. degrees in Civil Engineering from Virginia Tech.

Abstract: This paper presents stormwater solutions for a former industrial site in an ultra-urban area of Baltimore that was experiencing dropping groundwater levels during development of the site into high-profile office buildings and apartments. Existing regulatory requirements required an inward gradient to be maintained across a slurry wall to prevent leaching of contaminated soils, so a costly pumping system was in place to maintain the gradient. The desired solutions to this problem would reduce the need for pumping while enabling continued development of the site and keeping the construction schedule. To meet this challenge, the project team evaluated methodologies (e.g. stone columns, wells, bioretention, infiltration trenches) to infiltrate stormwater. Based on this evaluation, the team developed a plan to collect and test stormwater infiltration to bolster the groundwater level outside of the wall. First, an alternatives analysis was performed to assess the optimal location for an infiltration system. Next, extensive infiltration testing was performed by injecting potable water to a depth of approximately 40 feet below the ground surface using an infiltration well. Hydrologic and hydraulic modeling was conducted to evaluate the volume of stormwater able to reach the wells. Finally, the team developed the design of the pumping system and controls to direct the stormwater from existing pre-treatment systems to the wells. EPA and MDE approvals were obtained for the testing and implementation plans. The system was able to be integrated with the construction schedule, resulting in no lost time. Benefits of the project included minimized pumping while meeting regulatory requirements, leading to lower operation and maintenance costs. Because the system is primarily automated, less energy and personnel are needed. The system will serve as a model for future buildings as the remainder of the site continues to be developed. The innovative infiltration techniques used in this project will complement traditional stormwater practices. Purpose: Present innovative methods to infiltrate stormwater to meet regulatory requirements using a case study. Describe the process used and results of testing, as well as implementation information. Conclusions: 1) New methods are needed for stormwater treatment and infiltration in ultra-urban environments. 2) The presented methodologies provide an alternative for areas were upper soils do not have good infiltration rates. 3) The methodologies presented will reduce long-term operations and maintenance costs

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205 * Friday, August 30th, 2019 * 10:00:00 AM

Sarah Taylor, Gannett Fleming, Inc.

The Million Dollar Question – What to Do with Waste from Wastewater Pump Stations?

Speaker Bio: Sarah Taylor is a Project Engineer with Gannett Fleming responsible for assisting in design and construction services for water, wastewater, and environmental infrastructure. Ms. Taylor has 7 years of experience in the water/wastewater industry. Ms. Taylor has a Bachelor of Civil Engineering from University of Delaware and she is a registered Professional Engineer in Maryland.

Abstract: Anne Arundel County has approximately 250 sewage pump stations (SPS) within their collection system, which operate most efficiently if cleaned regularly of accumulating grit, grease, and rags. Several of the SPSs are pumped out weekly because of the unusually high levels of accumulated grease and grit, while the remaining SPSs are pumped out based on actual operating experience. The County is trying to address an efficient means of processing collected waste material. To improve the SPSs' cleaning operations, the County retained Gannett Fleming to perform a study to evaluate options for handling and processing the waste, and subsequently design a system that is able to accept and process the pump station waste. This presentation will discuss the investigations and analysis that were performed as part of the study, which included determination of current and projected sources, locations, quantities, and nature of material pumped from pumping station wet wells; identification and development of potential alternatives for selection of grease and grit treatment and disposal technologies; development of recommendations for the most effective strategy for management of grease and grit collected from County sewage pumping stations; and design of a system that can accept and process the waste. County's operations staff performing the cleaning operations has historically hauled the waste collected from their SPSs to treatment plants for processing. The County identified several concerns regarding that practice including: high concentration of grease and rags clogging the downstream pump stations, resulting in significantly increased operational and maintenance requirements; grease carried by the pumping station discharge flow to the treatment plants creating the potential for impairing the treatment processes; handling of SPS waste under this operation continues to result in numerous operational complications; and hauling the SPS waste and grit elsewhere involves significant cost and transportation time. During the study we determined that the concentrated SPS waste consists of specific characteristics that are very different from municipal/industrial wastewater or septage, and some of the screen manufacturers cannot process concentrated SPS waste. Based on pilot tests we performed with different screen manufacturers, we determined that a rotary drum type screen could process the SPS waste. Pilot testing helped determine the screen opening sizing and spacing to allow for good separation of the solids from the liquid, to optimize dewatering operations, and to ensure a continuous flow of the waste. Pilot testing also helped optimize the design of the conveyor system. Based on the study results, design of the facility began in 2016. It was designed to accept and process a maximum 27,000 gpd of waste and the screening unit was designed to allow for a 3,000 gallon vacuum truck to be able to unload in 10-15 minutes, utilizing a system that can accept and process SPS waste at a minimum rate of 200-300 gpm. The project bid in December 2018 and construction is expected to start in late Spring 2019, with a one-year duration.

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201 * Friday, August 30th, 2019 * 10:30:00 AM

Silver Chai, Howard County

Howard County Exposed Pipeline Rehabilitation, Prioritization and Protection

Speaker Bio: Silver Chai is a Project Manager working for Howard County Department of Public Works, Utility Design Division. She has over 10 years water and wastewater engineering and project management experience. Silver holds a Master's Degree in Environmental Engineering from Johns Hopkins.

Abstract: According to the record kept by National Weather Services, 2018 is the wettest year on record. It brought flooding all over the State, destroying properties, killing people, as well as imposing challenges to managing Howard County's Exposed Pipeline Rehabilitation Program. Like many other Utilities in the region, Howard County's water and sewer assets located in stream valleys can be vulnerable and severely affected by heavy rain and flash flooding that causes progressive and accelerated stream bed and bank erosion, leading to asset exposure. This presentation will step attendees through the management approach, inventory and condition assessment of exposed water and sewer pipelines, prioritization of projects, and design considerations for pipeline stream crossing, pipeline/stream restoration and stabilization. The principle goal of the Exposed Pipeline Rehabilitation Program is to restore the stream exposed assets and provide long-term protection through an adaptive natural channel design approach. This presentation will focus on specific examples, success stories and lessons learned while managing the Exposed Pipeline Rehabilitation Program in 2018 and prior.

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202 * Friday, August 30th, 2019 * 10:30:00 AM

Will Jernigan, P.E., Cavanaugh & Associates, P.A.

The New Validation Standard for AWWA Water Auditing - Evolutions in Water Audit Validation & Regulatory Requirements

Speaker Bio: Will Jernigan is a Director with Cavanaugh, and nationally recognized leader in Water Loss Management and Revenue Recovery. With 16 years in the industry, Will is an expert in Water Loss Management – having worked with over 1000 Utilities nationwide to address complex Water Loss challenges. Will actively serves AWWA in his role as a Trustee with the AWWA Distribution & Plant Operations Division, Chair AWWA Water Loss Software Subcommittee, Vice Chair of the AWWA Water Loss Control Committee.

Abstract: There is a growing recognition among the regulatory and infrastructure funding community that widespread adoption of effective utility management practices for water loss control have a measurable and meaningful impact as many states are ramping up technical assistance programs to build capacity – technical, managerial and financial – in the water utilities. These states recognize the foundational need for education, training, and validation per the AWWA M36 auditing and loss control methodology. One of those needs, validation, has been identified as a vital step in understanding and controlling water losses by providing a reliable picture of water loss standing in a utility. Established with Water Research Foundation Project (WRF) #4639A, water audit validation is the process of examining a water audit for data integrity and reliability, and can be categorized into three levels: Level 1 – high level, summary review and M36 application, Level 2 – deep analyses of raw data and instrumentation accuracy, and Level 3 – audits supported by field tests of instrument accuracy and confirmation of estimated real losses. Water audits that are not validated are categorized as 'self-reported', meaning the validity is not yet quantified. The AWWA Free Water Audit Software is the is the industry-standard tool for water utilities to compile their annual water audit. Utilization of the AWWA Free Water Audit Software is an important first step, but validation of the audit is integral to understanding the reliability of the input data, and in turn, estimated water losses. Without validation, the process of compiling a water audit is subject to systemic mis-grading and misapplication of the audit method. In short, the results may be unreliable. WRF Project #4372B (2015) found that across 5 regulatory agencies that were collecting AWWA water audits, those that did not employ the validation process had the highest percentage of audits with unrealistic results (i.e. negative loss), with one jurisdiction reporting 40 unrealistic audits. WRF #4372B, and a subsequent research project #4639, point to underlying causes for these widespread issues to be systemic problems in the measurement instrumentation and data management systems (supply metering, SCADA, customer metering, billing systems, etc), rather than direct human error. States around the country are recognizing the importance of the validation process to better understand their water losses. Recognizing that while some self-reported audits can be reliable, errors that undermine the audit accuracy can be systemic (supply measurement, billing data, etc), in the aggregate there must be a formal mechanism for validation of audits to make the dataset actionable. Three states – Georgia, California and Hawaii now have adopted a validation requirement for audits submitted each year. Given this accelerating rate of adoption –this presentation will focus on the outcomes of key WRF research projects on systemic issues undermining audit accuracy, and the methodology for water audit validation to obtain reliable and actionable results, to guide cost-effective water loss reductions which protect both the resource and the rate payer alike. Details of validation certification programs from Georgia and California will also be presented.

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203 * Friday, August 30th, 2019 * 10:30:00 AM

Engin Guven, Black and Veatch

How Diverting Organic Materials from Landfills affect Water Resource Recovery Facilities in California

Speaker Bio: Dr. Guven graduated from Marquette University with a PhD in environmental engineering. He has been working at Black and Veatch since 2016 as Senior Process Engineer. His work experience is primarily on biosolids planning and treatment projects.

Abstract: As stated in EPA's Fact sheet on final updates to performance standards for new, modified, and reconstructed landfills, and updates to emission guidelines for existing landfills, municipal solid waste (MSW) landfills receive non-hazardous wastes from homes, businesses and institutions. As the waste decomposes, it produces landfill gas, which includes carbon dioxide (CO2), a number of air toxics, and methane (CH4) —a potent greenhouse gas (GHG) with a global warming potential more than 25 times that of CO2. Methane is the second most prevalent greenhouse gas emitted by human activities in the United States, and nearly 20 percent of those emissions come from landfills. Landfills are the second largest industrial source of methane emissions in the United States (ref:EPA fact sheet). The path to GHG reduction goals and accompanying regulations in California began with Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, and culminates in Senate Bill (SB) 1383 (Lara, Chapter 395, Statutes of 2016). Rulemaking for SB 1383 is now underway. Among other GHG reduction requirements, SB 1383 also requires the diversion of organic materials from landfills as a key mechanism to reduce uncontrolled short-lived climate pollutant (SLCP) emissions including methane. With respect to diversion, SB 1383 specifically establishes the following statewide reduction targets for the disposal of organic waste: 50 percent reduction from the 2014 level by 2020 and 75 percent reduction from the 2014 level by 2025. CalRecycle has noted that composting and anaerobic digestion provide alternative outlets for diverted materials. The current draft language for SB 1383 includes biosolids in the definition of "organic waste". The prime objective of SB 1383 is to divert and recycle organic wastes from landfills, including the use of organic waste as alternative daily cover (ADC). Since many California wastewater agencies still landfill significant quantities of biosolids either during winter months (when it can't be land applied due to rain), or it is used as ADC, wastewater agencies are impacted directly by this legislation. Like biosolids, food wastes are included in the SB 1383 definition of organic wastes, so they must also be diverted from landfills and will require new management approaches. WRRFs are well suited to manage some of these materials, as liquid or slurried food waste can be cost effectively and beneficially co-digested in anaerobic digesters with municipal sludge, increasing biogas production. This paper will present experiences at the WRRFs while handling such organic wastes. Some of the issues that will be discussed are how to determine the appropriate tipping fee; metering the material into the digesters without causing an upset; increased gas handling and cleaning system capacities including air permit emission challenges (as some air districts in CA are discussing to lower NOx emission limits); site staffing and operator training (increased lab testing for digesters and delivered organics); and, sidestream load management (some organics have high nitrogen content).

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204 * Friday, August 30th, 2019 * 10:30:00 AM
Paul Nyffeler, AquaLaw PLC
Ethics

Speaker Bio: Dr. Paul Nyffeler is a senior associate at AquaLaw, after nine years in the litigation practice at a major international law firm. In addition to his environmental and general litigation experience, Paul brings a deep scientific background, with his Ph.D. in chemistry.

Abstract: This is a 1 hour ethics course.

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205 * Friday, August 30th, 2019 * 10:30:00 AM

Peter Schuler, Brown and Caldwell

Design, Startup and Operation of New Effluent Filters, UV and Lime Stabilization Processes at the Salisbury WWTP

Speaker Bio: Peter Schuler has over 29 years of experience in water and wastewater treatment. He has a BS in Chemical Engineering and an MS in Civil/Environmental Engineering • both from Penn State University. He is currently a Vice President based in Brown and Caldwell's Charlotte, North Carolina office but works all over the Mid-Atlantic region. Pete's current technical interests include all thin9» W6stewater - but especially nutrient removal. biosolids and new treatment technologies.

Abstract: The objective of this project was to convert the Salisbury Wastewater Treatment Plant (WWTP) from an attached growth to suspended growth activated sludge system to achieve Enhanced Nutrient Removal (ENR) limits for Total Nitrogen (TN) and Total Phosphorus (TP) as part of the Chesapeake Bay Nutrient Reduction effort. In addition, this project included installation of a new UV disinfection system, a new lime treatment system for biosolids that can produce either Class B or Class A biosolids and conversion of the existing Parkson continuous, upflow granular media filters with cloth disc filters. This presentation focuses on the design, startup and performance of these three new unit processes and the underlying reasons for making these changes. Careful siting of the new UV system was coupled with removal of hydraulic restrictions between the effluent filters and the location of the new UV building to allow the WWTP to increase wet weather capacity from 16 to 30 mgd. Conversion from upflow granular filters to cloth disc filters allowed the existing concrete structure to increase wet weather capacity from 16 to 30 mgd without constructing additional filter cells while reducing the amount of operator attention required to operate the filters. Installation of the lime stabilization system provides flexibility to produce either Class A or Class B biosolids depending on the disposal requirements. The presentation will include lessons learned during the startup and operation of these new unit process es for the City. In addition, a comparison will be provided between the operational costs predicted during the original process design and observed during the full-scale operation.

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201 * Friday, August 30th, 2019 * 11:00:00 AM
William Gilman, Brown and Caldwell
Managing Aggressive Project Delivery

Speaker Bio: Mr. Bill Gilman is a Civil Engineer and Vice President at Brown and Caldwell from their Alexandria office. He has over 40 years experience working on water and wastewater programs worldwide. He is a licensed professional engineer in numerous states and territories and is a certified program manager from the Project Management Institute. Mr. Gilman is a member of ASCE, AWWA, CWEA and PMI.

Abstract: The structure and processes used by local governments and utilities to manage capital programs are often developed with an entirely different focus than aggressive project delivery. What happens if your utility is suddenly faced with a huge Capital Improvements Program due to federal regulations, consent orders or high growth? Can your existing management organization and procurement structure handle the enormous upsurge in work? This presentation identifies how three utilities, Guam Waterworks Authority, Gwinnett County Dept. of Water Resources, and Rockdale Water Resources, met the challenge of aggressive project delivery on their large capital programs. It discusses the options for delivering an aggressive capital program, change management issues integrating a sudden influx of people into the organization, and efficiencies or disfunction in existing work-flow processes. With aggressive project delivery, new tools, new staff and increased expertise are necessary; yet they tax the utility on already limited resources by requiring internal oversight, training, and increased customer interface. Measuring and monitoring progress requires agreement among utility departments on metrics and incorporation of management information system tools to effectively capture the appropriate data. Effective planning, clear scope preparation, driving the schedule, and realistic budgets are key parameters to successful project delivery. Standardization of equipment, procedures, and details may ease the burden on engineering and operations staff; yet may conflict with procurement regulations. Conventional or alternative delivery methods present a tradeoff between ownership control and managing limited resources. Finally, knowledge transfer and transition of finished projects to the utility are necessary tasks that may involve additional training and new hires. These tools, experiences, and lessons learned from aggressive project delivery on large, successful, water and wastewater capital programs will be discussed, sharing knowledge that would benefit utilities facing any size CIP.

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202 * Friday, August 30th, 2019 * 11:00:00 AM

Charles Moore, CDM Smith

How Much Flow? Determining Wastewater Flow Factors From Water Billing and Land Use Data

Speaker Bio: Chuck Moore is a senior water resources engineer and associate at CDM Smith. He has a Bachelors and Master of Science degree in water resources and civil engineering from the Pennsylvania State University. He has more than 38 years of experience focusing on hydrologic, hydraulic, and water quality modeling, all with CDM Smith. Chuck serves as project technical director for many consent decree driven sanitary sewer system modeling and planning projects in the mid-Atlantic region.

Abstract: The Washington Suburban Sanitary Commission (WSSC) provides water and wastewater services to 1.8 million residents in Prince George's and Montgomery Counties in Maryland. WSSC uses multiple flow factors to estimate water demands and base wastewater flows when evaluating the impact of proposed development on existing facilities. The current flow factors are largely based on values published by the Maryland Department of the Environment, have unknown original sources, and appear to originate from several decade old studies. WSSC finds that the available categories do not represent current land use and zoning classes and may not accurately represent the water and wastewater flows associated with current development. In addition, the available land use types also do not relate well to current development or zoning. This creates significant uncertainty in the water and wastewater flows used to trigger capital improvement projects of existing facilities and design of new facilities that serve new development. WSSC has undertaken studies to review and update the flow factors with the goal of increasing confidence in its capacity evaluations and streamlining their planning processes. This presentation documents the methodologies and results of a study that correlated billed water use with land use to develop samples of properties within representative land use types. Results are compared with the factors currently used by WSSC and other regional localities and case studies that evaluated the impacts of applying the updated flow factors to current capital improvement projects are presented. Examples on how the methodology can be adapted by other localities to improve confidence in their planning decisions are also discussed.

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203 * Friday, August 30th, 2019 * 11:00:00 AM
Jim Fitzpatrick, Black & Veatch
Peak Flow Dual-Use Filters Also Help Meet Dry-Weather Goals

Speaker Bio: Jim has 25 years' experience as a process engineer for municipal, utility and industrial clients. He is a Professional Engineer with a Master's degree in chemical engineering from the University of Louisville. Jim has focused his last 20 years on the treatment of wet weather flows and nutrient removal and recovery with both conventional and advanced technologies. He is an active member of the Peak Flow Task Forces for NACWA and WEF and lead author of the High-Rate Treatment chapter in WEF's guidance manual Wet Weather Design and Operation in Water Resource Recovery Facilities.

Abstract: PROBLEM AND RELEVANCY: Many WRRFs battling wet-weather flows are seeking alternatives that also provide cost-effective benefits during normal flows, as opposed to only during wet weather. With the right technologies, facility design and operation, a dual-use treatment strategy may be more cost-effective and resilient than investing in additional storage and equalization infrastructure for peak wet-weather flows. EPA's new Peak Flow Management rulemaking along with increasing interests in effluent reuse, enhanced phosphorus removal and influent carbon diversion further raise the relevancy of this dual-use treatment strategy. APPROACH TO SOLUTION: Dozens of POTWs across the U.S. operate various enhanced high-rate treatment (EHRT) technologies in auxiliary wet-weather facilities. The earliest ones started up circa 2001, and most use some variation of chemically enhanced settling such as ballasted flocculation. However, for the same or less capital construction costs, newer generations of filtration-based EHRT alternatives also reliably treat wet-weather flows without needing chemicals. This offers operational cost savings and staffing advantages. Furthermore, these same high-rate filtration facilities can be used during dry-weather conditions to also serve one of the following functions without the expenses from additional chemical dosing (nor the resulting increased solids): (A) Tertiary Polishing – Removing additional particles from secondary effluent is helpful for effluent reuse, improving disinfection performance, and meeting stringent phosphorus limits, or (B) Enhanced Primary Treatment – Also called influent carbon diversion, this is intended to increase the capture of influent particulate organic matter, which can provide two-fold energy savings by decreasing downstream aeration/oxygenation demand and increasing anaerobic digestion biogas yield. EXAMPLES: The presentation will include the following case studies: (1) Compressible Media - The City of Springfield, Ohio's 100-mgd compressible media filter eliminated CSO-related bypasses at its WRRF and consistently meets secondary effluent permit limitations since its startup in 2015. The filtered effluent is easily disinfected by low doses of sodium hypochlorite (<4 mg/L). Full-scale performance agrees favorably with an 8-month onsite pilot study and other full-scale and pilot studies conducted across the country since about 2005. The same facility can provide tertiary polishing for future phosphorus limits. (2) Pile Cloth Media – The City of Rushville, Indiana began operating a dual-use pile cloth filter in 2017 to polish up to 4 mgd of secondary effluent and direct filter up to 12 mgd of additional screened wet-weather influent upstream of UV disinfection. The Fox Metro Water Reclamation District (Oswego, Illinois) and City of Wood Dale, Illinois also operate dual-use pile cloth filters for flows up to 168 mgd and 14 mgd, respectively. Similar facilities are under construction in Little Rock, Arkansas at the Adams Field WRF (36-mgd average, 94-mgd peak) and in Leawood, Kansas at the Tomahawk Creek WWTF (19-mgd average, 172-mgd peak). Onsite side-by-side piloting at the Adams Field WRF found that pile cloth and compressible media filtration produce essentially the same quality effluent, which is easily disinfected by low doses of either UV (<30 mJ/cm2) or peracetic acid (PAA, <4 mg/L).

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205 * Friday, August 30th, 2019 * 11:00:00 AM

John Dyson, Aqua-Aerobic Systems, Inc.

Enhanced and Simple Wet Weather Treatment with Pile Cloth Media Filtration

Speaker Bio: John holds a B.S. degree in Chemistry from Longwood College. He has spent 28 years in the water/wastewater industry working with many treatment technologies including clarifiers, filters, headwork equipment, disinfection processes, biological processes, and membrane processes in both the water and wastewater segments of the industry. He has worked on many wet weather projects. John is involved in many industry organizations such as WEF, WWEMA and AWWA and participates on several committees within these organizations.

Abstract: After extensive use of cloth media filtration in tertiary applications for over two decades, pile cloth media filtration has now been adapted for wet weather treatment. This wet weather/stormwater filtration technology offers a small footprint and is capable of treating extremely high solids while providing high quality effluent. Many studies have been conducted on raw domestic wastewater and wet weather conditions. The initial pilot study was conducted at the Rock River Water Reclamation District (RRWRD) in Rockford, IL in 2014, then Rushville, IN in 2015 and since then at other locations throughout the country. These studies have documented the technology's capabilities to achieve TSS removal of >80%. This high removal efficiency can be achieved without the use of chemicals. Additional study work has been done to determine if the addition of a coagulant will increase removal of TSS and BOD for wet weather applications. This paper will cover work conducted so far in many pilot studies and ongoing full-scale operating data from installations during wet weather conditions. The focus will be to do a comparison of influent and effluent performance achieved during pilot studies, full-scale operation including a comparison of pilot data versus full scale operation. Pile cloth media filtration has emerged as a new solution and a promising technology for the treatment of wet weather flows due to its proven performance and very simple operating requirements. For Rushville, IN and other installations, the cloth media filtration technology will allow the utility to treat the excess wet weather flow to a high quality, blend with the treatment plant secondary effluent, and use UV for disinfection. The blended flow of wet weather and secondary effluent will allow the treatment plant to meet its future NPDES permit limits.

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