Wednesday, September 1st, 8:30 AM
Andrew Silton, Beveridge & Diamond PC
Legal Risks to Collection Systems Posed by Clean Water Act Developments

Abstract

This presentation will address the regulatory and legal risks posed to wastewater collection systems by recent developments under the Clean Water Act (CWA). Just last year, the U.S. Supreme Court issued a decision in County of Maui v. Hawai'i Wildlife Fund, 140 S. Ct. 1462 (2020), holding that the CWA's prohibition on unpermitted discharges applies to releases of pollutants to groundwater that act as the "functional equivalent" of a direct, traditional discharge. The speakers, who authored an amicus brief submitted on behalf of a broad, nationwide coalition of wastewater utilities in the Maui case, will discuss the case's potential ramifications for sewer systems. Silton and Sullivan will first explain the basic federal framework governing discharges of wastewater and collection systems. They will provide an overview of basic components of the NPDES program and the CWA's permitting requirements. This portion of the presentation will also address how exfiltration has historically been regulated under the CWA: through capacity, management, operations, and maintenance ("CMOM") plans required under NPDES permits or consent decrees. The second portion of the presentation will discuss how the Maui decision has altered the CWA's applicability to pollutants released into groundwater. Silton and Sullivan will provide an overview of the Maui decision, which articulated a new "functional equivalence" test used to determine whether an NPDES permit is required for a release of pollutants that reaches surface water through groundwater. Their talk will also detail regulators' efforts to translate the Maui decision into concrete directives and guidance for the regulated community. The speakers will then discuss the risks that the Maui decision poses to wastewater utilities. Silton and Sullivan will explain how environmental regulators and environmental groups might seek to use Maui to argue that collection system exfiltration should be permitted as a discharge. If those arguments are successful, regulating exfiltration like traditional discharges poses problems for setting effluent limits in permits, as well as the difficulties utilities may find in demonstrating compliance with these permits. These difficulties, in turn, could lead to further enforcement against utilities. The final portion of this presentation will address how state groundwater protection programs might apply to exfiltration and the likely consequences of such application. Even if Maui does not lead to the application of the NPDES program to exfiltration, Maryland, Delaware, and the District of Columbia may be spurred to explore more aggressive implementation of existing programs that regulate groundwater. Silton and Sullivan will examine how these programs might apply to collection systems, the risks associated with these programs' application, and how wastewater utilities could manage these risks.

Speaker Bio

Drew Silton is a Principal in Beveridge & Diamond, PC's Washington, DC office, specializing in regulatory matters and litigation arising under the nation's clean water laws. A co-chair of the firm's Water Practice Group, Drew represents public and private sector clients in regulatory compliance, litigation, and enforcement matters involving an array of subjects, including wet weather requirements, pretreatment, and NPDES permitting.

Wednesday, September 1st, 8:30 AM
Jim Fitzpatrick, Black & Veatch
Cold and Waterproof Biological Nutrient Removal

Abstract

The 2.5-mgd Wakarusa River WWTP, 64-mgd McAlpine Creek WWMF, and 181-mgd EchoWater Project are among the latest adopters of a rediscovered variation of enhanced biological phosphorus removal (EBPR) that is more stable, reliable and efficient than common mainstream configurations such as anaerobic/oxic (AO) and anaerobic/anoxic/oxic (A2O). Recent work shows that a subgroup of processes referred to as side-stream EBPR (S2EPBR) overcomes shortfalls of mainstream configurations and provides stable and reliable phosphorus removal despite cold temperatures and wet-weather flows typical to the Chesapeake Bay region. Black & Veatch has designed S2EBPR facilities for about a decade and was selected in 2019 by the Water Research Foundation to lead a team of 17 utilities, five consulting firms, and five universities to develop industry-wide design guidelines, operational recommendations, and modeling best practices for S2EBPR. Fermentation and phosphorus release in S2EBPR take place in a side-stream anaerobic bioreactor that receives return activated sludge, but none or only a small fraction of the mainstream influent. The side-stream configuration protects these bioreactions from wet-weather upsets. In addition to promoting conventional phosphorus accumulating organisms (PAOs) like Accumulibacter, these S2EBPR configurations also promote denitrifying PAOs (like Tetrasphaera) and are fatal to competing glycogen accumulating organisms that have poorer cold-weather kinetics than PAOs. Luxury phosphorus uptake takes place in the main liquid stream under both oxic and anoxic conditions compared to only oxic conditions with conventional EBPR. The side-stream configuration provides more robust and consistent phosphorus removal year-round, and the denitrifying PAOs use influent carbon more efficiently, which is helpful for both phosphorus and nitrogen removal. This improves process stability and reduces operational costs compared to conventional configurations. Effluent TP less than 0.2 mg/L after these upgrades is common without any chemical addition. Data and performance results from referenced full-scale operations will be presented.

Speaker Bio

Jim has 27 years of experience on wastewater treatment projects ranging from planning, studies, pilots, design, startup and optimization. He was the lead chapter author on Identifying and Managing Risks in WEF's 2015 Nutrient Roadmap and served as a panel judge for the Everglade Foundation's George Barley Water Prize, a $10 million contest for technologies to remove phosphorus below 0.01 mg/L at a fraction of the cost of the current state-of-the-art.

Wednesday, September 1st, 8:30 AM
Kevin Flis, Xylem
Intelligent Networks: High Quality Water from Source to Tap

Abstract
Learning Objective The audience will learn best practices on how to reduce water age through the distribution system. Additionally, these same practices can lead into high situational awareness of operations staff and lowering operating costs. Background As our infrastructure ages and populations grow, the stresses on the operations of our drinking water distribution system increase. This can be compounded for many utilities that have multiple sources for their water as the delivery of this essential resource can age in our pipes and holding tanks leading to reduced chlorine residuals which can reduce water quality. Methodology Upgrading the entire distribution network is typically an unlikely proposition given the extreme costs to undertake such an endeavor. Fortunately, with the advent of technology we can leverage the data at utilities' have at their fingertips to create a digital twin of the distribution system and provide a clear view of the operations of the distribution network and age and quality of the water that is being delivered. The digital twin is formed by integrating the network hydraulic and quality models with SCADA and billing data. This link is performed by using USEPA's Epanet-RTX. Through the formation of this digital twin the operations team can predict and forecast system wide water quality (water age and chlorine residual) and hydraulics (flows, velocities, pressures, and tank levels). A result of streaming this real-time data with the water quality and hydraulic models, is that the operations staff now has a Real-Time Decision Support System (RT-DSS) available to them to inform them of appropriate operational decision making to achieve the desired outcome. Findings & Status The outcomes that have been realized from leveraging this RT-DSS include: Improve chlorine residual and reduce frequency of nitrification episodes through hydraulic tank management and water age reductions. Lower costs and risks by enhancing operational knowledge and situational awareness. Reduce energy costs through better pumping and valving decisions. Utilities in Nashville and Hillsborough County are leveraging the RT-DSS support tool to identify potential dead ends, recognize conditions that lead to higher water age, and better understand which operations lead to higher energy costs. With the support of the prediction capability of the RT-DSS, these utilities are now using this information in 2 ways. First, they are optimizing the distribution network to reduce water age and energy consumption to deliver higher water quality water to their customers at a lower cost. Second, they are now making more informed decisions as to how they want to maintain their aging infrastructure.

Speaker Bio
With over 13 years of experience in water and wastewater, Kevin Flis has been an integral part of many of the different facets required in planning, developing, and implementing digital solutions. Kevin now focuses his attention on advancing collaboration and resiliency through a One Water approach.

Wednesday, September 1st, 8:30 AM
Mark Johnson, Jacobs Engineering
Design-Build for Large Conveyance Projects: Constructing a Winning Formula for Success

Abstract

The design-build (DB) project delivery model has successfully been used in constructing major tunneling projects around the world. This paper discusses some of the advantages of using the DB project delivery model and highlights lessons learned that can be applied during the DB procurement phases of the project (planning/pre-engineering, pre-qualification and proposal) in order to optimize project outcomes. These will be illustrated with real-life examples from local projects and others around the world. The paper will review some of the advantages offered by the DB procurement model and how it differs from other delivery models such as the Design-Bid-Build (DBB) model. Some of these advantages include single point of responsibility, opportunities for innovation, improved coordination between contractor and designer and potentially a faster schedule. The paper will then describe the various phases of DB procurement and highlight lessons learned from real-life projects which include: 1) Planning and Preliminary Engineering. In this phase it is important to not only develop the reference design but also to identify information relating to specific project risks and clear all possible obstacles to the progress of the DB contractor once they begin design and construction. Some examples include geotechnical investigations, right-of-way acquisition, interfaces with 3rd party stakeholders, permitting, surveying and consideration for early construction packages. 2) Pre-Qualification and Attracting Bidders. In this phase the project owner wants to attract interest in their project as increased competition can result in better quality bids and more cost-effective proposals. The most significant factor influencing DB teams on whether they will bid a DB project is how the DB contract documentation is structured. There are many commercial and legal elements that can be incorporated to attract bidders such as: a reasonable risk share model between the owner and the DB contractor, adoption of dispute resolution methods (such as Dispute Review Board), allowances or unit rates to cover items that are difficult to quantify and present pricing risk, escrowing of bid documents, allowing alternative technical concepts (ATCs) that can bring innovation and benefits to the project, evaluating proposals on a best-value basis, shortlisting bidders after the pre-qualification process and offering a stipend payment to unsuccessful bidders that make the shortlist. 3) Proposal and Bid Evaluation Phase. In combination with allowing ATCs, the owner should consider adopting a collaboration process with the DB teams during the proposal phase where potential ATCs and contractual and commercial issues can be discussed in a confidential manner. This collaboration can maximize the chances that the ATCs will meet all project requirements and functionality, can improve the quality of the bids and can build trust between the owner and the DB teams. The design-build procurement model is becoming more attractive to owners as it can provide benefits in innovation, cost and schedule. This paper will present an overview of elements that should be considered during the procurement process to attract more bidder competition and optimize cost, create room for innovation, and obtain the information that really matters when selecting a DB team.

Speaker Bio

Mark has more than 25 years of specialized experience in tunnel and underground engineering. He currently serves as Jacobs' Engineering VP of Tunnel and Ground Engineering and his experience covers tunnel projects in the US, UK, Canada, Malaysia and Singapore, including a significant number of design-

build projects. He recently served as Project Director for the design team that delivered the Blue Plains Tunnel in Washington D.C., winner of ENR Magazine's 2016 "Best of the Best" Project Award.

Wednesday, September 1st, 8:30 AM
Kristi Latimer, Mott MacDonald
Ensuring New York City's Water Supply: Condition Assessment of an 18-Foot Diameter Tunnel

Abstract
Imagine being asked to inspect a 100-year-old tunnel that carries 40% of NYC's water and has limited shutdown opportunities. This presentation will cover the Lower Catskill Aqueduct (LCA) Reconstruction Project, specifically the use of progressive reality capture technology to implement an efficient/cost-effective tunnel condition assessment program. Owned and operated by the NYC Department of Environmental Protection, the LCA consists of an 18-foot, 12-mile section of the Catskill Aqueduct that conveys treated water. There are several challenges to assessing the condition of and rehabilitating the LCA. First, the aqueduct conveys approximately half a billion gallons of water to NYC daily, and shutdowns are limited to less than 24-hour durations. Opportunities to inspect the aqueduct are rare and based on seasonal water consumption, therefore inspection and rehabilitation must be both efficient and accurate. Second, the LCA consists of four principal construction types: cut and cover tunnel, grade tunnel, steel pipe siphon, and pressure tunnel, requiring deficiency identification methodology/capture to be flexible and agile without sacrificing accuracy. Finally, given the risk of permit-required confined-space entries and the scale of the project, digitally efficient mobile information capture was a critical assessment aspect. To address these challenges, hybrid Reality Capture Technology was utilized, consisting of Remotely Operated Vehicle (ROV) inspections, photogrammetric/kinematic scanning, and terrestrial laser scanning. The photogrammetric scanning facilitated 360-degree continuous data collection capable of adapting to the aqueduct shape and efficiently scanning under continuous movement. A fully integrated project context model and geodatabase of defects could then be generated and included in the construction bid process. Through the utilization of innovative deficiency identification and 3-D modeling capabilities, a seven-week (35-day) shutdown schedule was reduced to twelve 24-hour shutdowns. This cost-effective assessment approach and process has had the additional benefit of a streamlined design and proposed delivery method.

Speaker Bio
Ms. Kristi Latimer has 25 years of experience in civil, structural, and construction engineering for the design, rehabilitation, and construction management of tunnels and underground structures for highways, transit systems, water resources, storm, and sanitary facilities. She serves as structural engineer, tunnel design, construction engineer, safety engineer, project manager and chief inspector for new construction as well as the rehabilitation and modernization of existing facilities.

Wednesday, September 1st, 9:00 AM
John Fraser, Carollo Engineers
Benefits and Considerations of External Unaerated Zones When Upgrade Existing Facilities for Nutrient Reduction

Abstract
Effluent nutrient discharge criteria continue to become more stringent across the country. Meeting tighter effluent nitrogen and phosphorus limits can require modification of existing activated sludge processes to incorporate various forms of biological nutrient removal (BNR). One common approach to achieve BNR is to modify existing aerations basins to include multiple unaerated zones that provide anaerobic and anoxic conditions within a common aerobic aeration basin. BNR modifications can also require new internal mixed liquor recycle pumping and piping systems. Converting existing aerobic zones to unaerated conditions for nitrogen and phosphorus removal reduces the basin volume available for aerobic nitrification resulting in the need to de-rate the capacity of existing aeration basins. Many agencies also find that taking aeration basins out of service for extensive and sometimes complex internal modifications is costly and can leave the facility short on capacity during construction. In order to provide BNR and avoid construction within existing aeration basins and potential loss of capacity during construction, some agencies have used external unaerated zones constructed outside of existing aeration basins. This presentation will explore the potential benefits and tradeoffs of external unaerated zones as compared to traditional BNR basins with a combined unaerated and aerated configuration. An overview of three case studies and examples of the use of external unaerated zones will be presented including a: 30 mgd TF/AS conversion to BNR, a 12 mgd oxidation ditch conversion to BNR, and the 9 mgd conventional activated sludge plant conversion to BNR.

Speaker Bio
John manages Carollo's Wastewater Practice tracking trends and maintaining a team of engineers and scientists with experience and knowledge to offer creative and innovative solutions in all aspects of municipal wastewater and biosolids. Specific expertise includes nutrient removal, intensification, energy reduction, sustainable practices, and community asset considerations. John develops cost conscious and high performing facilities with Robust, Easy to Use, Logical, and Innovative features.

Wednesday, September 1st, 9:00 AM
Hala Flores, WSSC Water
Transforming developer-built project delivery through trackable workflow processes at WSSC Water

Abstract

Established in 1918, WSSC Water has entered its second century as one of the largest water and wastewater utilities in the nation, with a network of nearly 5,768 miles of fresh water pipeline and over 5,578 miles of sewer pipeline. Our service area spans nearly 1,000 square miles in Prince George's and Montgomery counties, and we serve 1.8 million residents through approximately 475,000 customer accounts. The Engineering and Construction Department (ECD) within WSSC Water has engaged in radically redesigning work by examining and transforming the planning, design and construction processes for developer-built projects. In 2012, ECD launched a customized electronic workflow within the ePlan (Projectdox) enterprise platform for managing the plan review from the project inception through the hydraulic planning, system design, and plan approval phase. This workflow greatly enhanced collaboration between all stakeholders and allowed for stream lining the project communication, integrating quality control measures, and reducing the plan review turnaround times. In 2017, ECD launched another customized workflow through the Energov (ePermitting) enterprise platform. The system is integrated with the ePlan system and allows the tracking of all the project's administrative information such as permitting, agreements, variances, rights of way, outstanding conditions, and much more. As increased efficiency was realized at the front end of the project, managing the workflow and tracking the project through construction remained a challenge. In 2020, ECD launched a third integrated process workflow through the e-Builder enterprise platform to redesign the construction process. The new workflow is customized to deal with the variety of developer-built projects from site utilities to system relocations and extensions. The process employs a dynamic collaborative grid that allows the project team to effectively communicate through the submittal, review, and approval process during construction. Inspection checklists and milestone approval actions such as the physical acceptance letter, the certificate of substantial completion, the certificate of final acceptance, and final close out of the project finances were identified and tracked as steps with automated actions. This presentation will showcase how WSSC water has transformed the entire life cycle of the developer-built project delivery system though these collaborative and integrated workflow processes. The presentation will include some custom reports and dash boards that were created from these platforms. These reports have shed light on the work volume and performance trends and have advised management and fiscal decisions to improve customer services, quality, and accountability. These electronic and integrated workflows shone as examples of resilience during the COVID-19 crisis allowing our workforce to stay safe, productive, accountable, and efficient during these uncertain times.

Speaker Bio

Hala Flores is a Development Project Manager at the Engineering Construction Department within WSSC Water. Hala is a registered Professional Engineer in the State of Maryland with 23 years of diverse experience spanning multiple areas including utility planning, design, modeling, construction, and general development master planning and policy advising. Hala holds an M.S. degree in Civil Engineering from the University of Illinois in Urbana Champaign with emphasis on Hydro-systems design.

Wednesday, September 1st, 9:00 AM
Nichol Sowell, DC Water
DC Water's Blueprint for Mobility: Fire Hydrant Application Development and Deployment

Abstract

DC Water's Water System Asset Management Plan builds off the international standard ISO 55000 and provides guidance on the lifecycle management of system infrastructure within the District. ISO 55000 defines Asset Management as "coordinated activity of an organization to realize value from assets". The asset management plan includes recommendations on improving data management processes, field data collection, and to transition from location-based work orders to asset-based work orders. Additionally, DC Water is obligated via a Memorandum of Understanding with the District's Fire and Emergency Management (FEMS) Department to service, maintain, repair, and report on all public hydrants. Currently, DC Water manages approximately 9,600 fire hydrants throughout the District's nine pressure zones. The fire hydrant data is maintained in the systems of record GIS and Maximo, the Computerized Maintenance Management System. The maintenance of these fire hydrants ensures public safety and mitigates risk of property loss due to fire. Due to the critical nature of these assets, the project team looked to resolve several operational problems including: synchronizing Maximo and GIS data sets, near 'real-time' attribute updates, operational status updates, and associating work, labor, and material to the asset; this information would then be shared with FEMS on an hourly-basis. This presentation will discuss the development of the custom mobile field application, quality assurance quality control (QA/QC) tool, and KPI dashboard in support of fire hydrant operation and maintenance. This presentation is divided into four phases: 1. Requirements Phase 2. Development Phase 3. Testing & Acceptance Phase 4. Implementation Phase The requirements phase included a review of a now-obsolete version of the application, interviews with foremen and field crews, review of existing asset registries, and review of organizational business processes. This phase highlighted the need to track, validate, transfer, qa/qc, and analyze work order, crew, and asset data. The development phase was managed via the agile project management approach and included six sprints. The team met weekly to update project status and schedule. The development included a system whereby information was exchanged from Maximo, Enterprise ArcGIS, Mobile Application, QA/QC GIS layer, and MS Azure SQL database. The testing & acceptance phase included: power-user designation, training, software installation, use-case scenario development, and development of test environments for systems of record. The goal of testing and acceptance phase was to ensure the application met all requirements. Finally, user-acceptance testing and approval was completed in advance of 'Go-Live'. The implementation phase included: training manual development, virtual and in-person training, and weekly troubleshooting and status meetings. In summer of 2020, the final application was rolled out to six two-person crews, foreman, and support staff. The application roll-out was successful, but not without the need for troubleshooting and patching; which will be discussed further in lessons learned. In addition to describing the mobile application development and deployment process, this presentation will review: the agile project management methodology, advantages and disadvantages of a custom mobile application, lessons learned, and improvement in operational efficiency and cost savings.

Speaker Bio

Nichol Bell Sowell is a licensed professional engineer working at DC Water in the Water Operations Department. Nichol has 15 years experience in the planning, design, construction, and asset

management of water and sewer infrastructure. Nichol has a Bachelor's degree in Civil Engineering and Masters of Engineering Environmental Degree. In her current role she oversees a team focused on programs including: condition assessment, data management & analytics, and operations & maintenance planning.

Wednesday, September 1st, 9:30 AM
S. Rao Chitikela, RC-WEE Solutions
Ethics and Water Professionals

Abstract

The observation of professional-ethics has become critical more than ever. An effective inclusion of ethics, training, and practice is important to professionals accomplishing on various tasks every day. Updates to applicable principles of ethics are ongoing by various professional societies, institutions, and organizations and, including the business communities (or, entities). The requirements of ethics have been noticed and put into practice since the BCE, and are periodically refined for effective application by professionals. As Dr. Dereniowska explained, the environmental ethics are a combination of "anthropocentrism and non-anthropocentrism." In the current and aggressive 4th industrial revolution ongoing, we as the (world-)society by-large unfortunately halted by the CoVid19 and, requiring us to a clear adoption and practice of ethical principles in the rejuvenation of world-affairs, including effectively undertaking the changing weather patterns, into the future. At the core, the answers to what are ethics and what is a gift need to be well implanted into the professional practice. A 'gift' is defined as "item having monetary value" per the US-Senate. The professionals are well identified and have applicable requirements under the code of federal regulations (CFR) and as adopted or included by the individual states. In the academia, for example, the University of Delaware (in DE) code of ethics includes, "Adherence to the highest standards of honesty, integrity, and fairness by University personnel is essential to assure proper performance of University business and maintenance of confidence in the University by students and citizens. . ." And, in our Water Science and Engineering profession, we apply and practice the requirements of ethics and, where we periodically obtain training and fine-tune our knowledge, such as reviewing the ethics' guidance Fundamental Canons for Engineers as stipulated by the National Society of Professional Engineers (NSPE). The American Society of Civil Engineers (ASCE) recently updated the ethical responsibilities for its members to observe on (in the order): society; natural and built environment; profession; clients and employers; and, peers. Similarly, the American Institute of Chemical Engineers (AIChE), Institute of Electrical and Electronics Engineers (IEEE), and other professional societies have principles of ethics that need to be observed by its members. The government (federal/state/local) employees including regulators are thoroughly trained on ethics, as part of the job responsibilities. As an example, it is important to note the environmental, health and, safety and security (EHSs) professionals learn and practice ethics (as applicable) in working each day with multifaceted entities. This presentation will include: the (brief) explanation of ethics as stipulated by various (selected) professional societies, institutions, and organizations; professional-ethics requirements of Tri-States of MD and DE and, Washington DC to professional engineers and surveyors; a review of one or two selected "examination of ethical cases"; and, one or two author(s) observed case study-discussion (to the extent feasible). Thus, a comprehensive review of professional-ethics would be provided towards a good-guidance on ethics to various Water professionals.

Speaker Bio

S. Rao Chitikela holds a PhD in Civil Engineering and has a 30-yr work experience encompassing the government, industry, and academia. Rao currently is an adjunct instructor at the Central State University OH; and, independent consultant providing water-infrastructure updating, energy-efficiency, and EHSs services. His proven expertise includes: drinking water and wastewater processing; air

pollution control; and, environmental permitting. He is a registered professional engineer and BCEE-AAEES.

Wednesday, September 1st, 9:30 AM
Karen Edwards-Lindsey, U.SEPA Water Security Division
Be Water Resilience Ready

Abstract

Drinking water and wastewater systems across the country are at risk to many kinds of water emergencies which could cause disruptions in their service. The risks and threats range from floods, droughts and fires, to cyber-attacks and broken mains. The types of assets that are at risk to these hazards include: pipes, physical barriers, source water, water collection and intake, electronic, computer, or other automated systems and many more. The United States Environmental Protection Agency (USEPA) developed tools and resources that can help identify risks and build resilience within your water system. During this session, USEPA's Water Security Division will discuss the America's Water Infrastructure Act (AWIA), which requires each community water system serving a population greater than 3,300 persons to assess the risks to, and resilience of, its system. The participants will be informed of the tools and resources to assist utilities with developing their Risk and Resilience Assessment (RRA) and Emergency Response Plan (ERP), including the Vulnerability Self- Assessment Tool (VSAT), the Baseline Information on Malevolent Acts for Community Water Systems document, the Small Systems Risk and Resilience Assessment Checklist, and the Emergency Response Plan Template and Instructions. Information will also be provided on how to certify completion of Risk and Resilience Assessments and Emergency Response Plans by the applicable deadlines. After compliance with AWIA, a natural next step is to identify and implement mitigation measures to further build resilience. Studies show that for every one dollar spent on mitigation utilities can save six dollars in damage from disasters. Participants will learn about USEPA's guide, Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities. It is an easy-to-use, clickable guide that provides examples of mitigation projects for flooding as well as for other disaster scenarios that water utilities might face and guides utilities on eligibility for federal funding for these projects, including new Federal Emergency Management Agency funding for hazard mitigation.

Speaker Bio

Karen Edwards-Lindsey is an Environmental Protection Specialist who joined the U.S. Environmental Protection Agency in 1997. She currently works as the project lead on multimedia outreach to the Water Sector and key stakeholders. She also works on other projects to raise the awareness among other critical sectors, at local and state levels about the importance of water and its role as a lifeline sector. She has a Bachelor of Science in Business Management from Maryland University.

Wednesday, September 1st, 9:30 AM
Caitlin Feehan, Alexandria Renew Enterprises
AlexRenew's RiverRenew Tunnel System Fixed-Price, Design-Build Procurement in the Time of COVID-19

Abstract
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 the city'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, which requires that Alexandria's four combined sewer outfalls be brought into compliance by July 1, 2025. In February 2020, AlexRenew released a complex Fixed-Price, Design-Build Request for Proposal to three shortlisted design-build teams to develop detailed technical and price proposals and collaborate with AlexRenew as part of the procurement process. Originally intended to occur in a confidential, face-to-face environment to facilitate understanding and relationship building, as well as technical innovation and discussion, the approach needed to adjust as a result of the pandemic. A quick and effective transition to a remote format was necessary to execute the collaborative process effectively, ensure security and confidentiality, communicate technical requirements and innovations, and foster productive relationships and engagement, as the Design-Build Team will be AlexRenew's partner in successfully complying with the Commonwealth of Virginia's legislative mandate.

Speaker Bio
Caitlin Feehan is a graduate of Northwestern University with a B.S. in Environmental Engineering and Yale University with an M.S. in Environmental Management. She is a professional engineer with more than 13 years of experience. Her notable projects include the DC Water Clean Rivers Green Infrastructure Program and AlexRenew's RiverRenew Tunnel System Program where she currently serves as the Program Director.

Wednesday, September 1st, 9:30 AM
Dennis Lopez, WSSCWater
Improving the PCCP Condition Assessment Prioritization Method by Incorporating AFO Monitoring Data Record Analysis.

Abstract
The Washington Suburban Sanitary Commission (WSSC Water) provides water and wastewater services to 1.8 million residents in Montgomery and Prince George's counties in Maryland. With a network of nearly 5,844 miles of water pipeline and over 5,610 miles of sewer pipeline, WSSC Water is among the largest water and wastewater utilities in the nation. The water network includes 145 miles of prestressed concrete cylinder pipe (PCCP) ranging from sizes 36 to 96 inches in diameter, this is the backbone of the water system. The WSSC Water PCCP Management Program is responsible for monitoring the distress of the pipes, conducting planned internal inspections for a comprehensive physical condition assessment evaluation, and doing the necessary replacements and rehabilitation to prevent failures and extend the service life of those PCCP pipelines. The PCCP monitoring is performed by using Acoustic Fiber Optic (AFO) cables to detect the sounds associated with pre-stressed wire breaks on PCCP sections while the pipelines are in service. As of 2020, over 100 miles of AFO has been installed, making it the longest active monitoring system in the United States. The planned inspections are an important task that allows a comprehensive physical condition assessment of the PCCP pipes; Since 2007 PCCP pipelines ranging from 48" – 96" in diameter have been on a 5 years inspection cycle, with a mileage goal of 18 miles per year. However, as the program matures and seeks to address the need of including PCCP of smaller diameter (but still critical for the system), it becomes necessary to increase our level of confidence to target the right pipeline at the right time; Therefore, the prioritization approach has been recently enhanced by adding analysis of AFO monitoring data records as a risk indicator parameter. Purpose: To present the latest Prioritization Methodology used in the WSSC Water PCCP Program for inspections, its results and the benefits. To explain the AFO data analysis for this purpose, and the scoring criteria to ultimately assign a priority ranking to each pipeline when combined with the other parameters. And to explain the opportunity of maximize the resources by increasing level of confidence in the prioritization.

Speaker Bio
18 years of experience in the engineering field that includes analysis, planning and design of Water & Wastewater infrastructure projects, Civil Land Development projects, and Water Resources Studies. - Professional Licensed Engineer (Maryland, Pennsylvania and Puerto Rico). - Bachelor's Degree in Science of Civil Engineering. -Master of Sciences in Civil Engineering (Hydraulic &Hydrology) -Master in Business Administration candidate Currently position - Principal Civil Engineer at WSSC

Wednesday, September 1st, 1:00 PM
Emily Sadowsky, Arcadis
Comparison of Effectiveness and Cost of High- and Low-Pressure Smoke Testing Methods

Abstract

The Little Rock Water Reclamation Authority (LRWRA) Small Diameter Sewer Rehab Program is obligated to reduce peak wet weather flows from 4 sewer sheds totaling 327 miles by 35% by the end of 2023. Smoke testing was selected for basins where inflow sources are strongly indicated by the flow data as it is a useful way to locate of cross-connections between storm and sanitary sewer systems, roof drain connections, clipped below grade cleanouts, and area drains. The technique can also secondarily identify sections of the sewer main and lateral so badly broken that there is direct connection with the surface through soil fissures. However, the ability of to find these secondary sources is limited to the existence of a pathway between the pipe defect and the ground surface. The greater the smoke testing pressure used, the more of these secondary defects that can theoretically be identified. (These same defects can be found via CCTV inspection, but the concept is that these secondary smoke test findings can inform where to televise). However, applying greater pressures to increase these secondary findings requires a smoke testing technique that significantly increases the cost of smoke testing. The resulting improvement from this higher pressure method has not been previously quantified. To evaluate the effectiveness of different techniques, Arcadis devised and conducted testing using the two smoke testing methods within the same segments of pipe as part of the LRWRA program. The first method, more expensive high pressure method was conducted using a two blower system with sandbags to pressurize a single segment of pipe. The second, normal pressure method was conducted using a single blower where the extents of the test generally covered 4-6 segments of sewer per blow. The high-pressure system reduces the total footage of pipe that can be inspected in a day due to increased setup frequency and time but theoretically offers the opportunity of discovering smaller defects. Low-pressure smoke testing increases daily efficiency by reducing setup times and expanding the boundaries of the test but theoretically uncovers fewer pipe defects. This paper presents these findings.

Speaker Bio

Emily Sadowsky is a buried infrastructure specialist for Arcadis. Mrs. Sadowsky specializes in conditional assessment and construction activities related to buried infrastructure work for municipal and industrial clients. She is an experienced construction manager for CMAR and Design-Build projects. She is also a senior construction inspector for traditional contractor oversight. She has 15 years of engineering experience and holds a BS in Environmental Protection from West Virginia University.

Wednesday, September 1st, 1:00 PM
Jon Liberzon, Tomorrow Water (BKT)
New Primary Bio-Filter Achieves High-Rate Treatment for Wet-Weather Inflows

Abstract
Exceedance of design flows from inflow and infiltration (I&I) during wet weather events pose a significant risk to POTWs. In April 2018, the U.S. EPA began a new rulemaking process for management of peak wet weather flows (WWF) at plants with separate sanitary sewer systems. In preparation for these new potential regulations, it is critical to identify and evaluate space-saving peak flow management technologies which can efficiently and reliably achieve target effluent qualities at affordable costs to ratepayers. This presentation presents results from 13-months' piloting of a new biological primary filter for rapid treatment of excess flows. The pilot, performed at a blending permit plant in Genesee County, Michigan, tested two distinct configurations of the Proteus™ up-flow media filter: a primary filtration (PF) reactor for removal of suspended solids (TSS) and particulate biological oxygen demand (BOD), and a biological (B) reactor equipped with aeration for biofilm growth and oxidation of BOD. Both utilize a new, X-shaped polypropylene media designed specifically to filter high-solids primary influent and maximize specific surface area for improved biofilm density. In both reactors, sensors tracked flow rate, TSS, bed pressure, reactor DO, and temperature. Composite samples tracked a range of water quality factors including BOD, TSS, COD, nutrients, microbiological indicators, and chlorine demand. To emulate the variability of wet weather flows, some weeks of testing diluted raw water while others amended influent with primary sludge. This allowed for testing of influent SS from 50-1192 mg/l, total BOD from 40-663 mg/l and soluble BOD from 15-146 mg/l. When processing plant influent, the PF reactor processed up to 133 gpm, achieving average TSS removal of 78%, BOD removal of 69% and COD removal of 67% at empty bed contact times (EBCTs) of 5-13 minutes. When processing primary effluent, the same reactor removed 71% of TSS, 51% of BOD and 56% of COD. The biological (B) reactor processed up to 64 gpm, achieving TSS removal of 84%, BOD removal of 81% and COD removal of 78% at EBCTs of 10-30 minutes in screened raw water. Treatment of primary effluent yielded equivalent TSS removal, but reduced BOD/COD removals of 60%/58%. BOD removal improved with increasing EBCTs and higher loadings. The biological configuration also showed improved removal performance for total and fecal coliforms, chlorine demand (88% reduction) and nutrients. In Spring 2020, the pilot captured a real peak flow event. Despite two weeks of minimal feeding prior to wet weather, the biological reactor maintained effluent TSS/BOD below 30/22 mg/L during two days of WWF at double the plant's rated capacity. These results demonstrate that a combined primary/biological filter can provide rapid treatment of excess flows, providing a new treatment option for utilities in dealing with wet weather. Biological filters also require ~80% smaller footprints than traditional settling systems, providing an option for space-limited treatment plants. Since primary biofiltration can also be applied to replace primary clarifiers or add tertiary nutrient removal, dual-use opportunities exist for achieving multiple treatment goals during plant upgrades.

Speaker Bio
Jon is VP at Tomorrow Water, a CA firm that develops advanced water, ww and solids treatment technologies. Prior to joining TW, Jon consulted for ind'l and multinationals including the World Bank, and served as director of water tech at Algal Scientific. He focuses on biological ww treatment but also

he has experience with drinking water and agri dev in least developed countries (LDCs). He holds a Masters from the Technion – Israel Inst. of Technology, and a Bachelors from the U. of Michigan

Wednesday, September 1st, 1:00 PM
James Parkes, Schnabel Engineering
Converting Quarries into Reservoirs - Geotechnical Design Considerations

Abstract

Many municipalities are looking at former quarries as possible solutions for future raw water storage needs. Such quarries offer several benefits to the local communities, including beneficial land re-use, additional water storage, and less permitting requirements compared to dams. While each quarry reservoir is different, many common geotechnical design considerations will apply regardless of the location or geometry of the quarry. This presentation will focus on rock quarries, which typically include a layer of soil overburden around the quarry, a deep excavation in rock with multiple levels of benches, and local groundwater considerations. Design considerations include considerations for the type of intake structure to withdraw water from the reservoir. Possible intake structure options will be reviewed, including cantilever, sloped, tower and bridge, and shaft and tunnel alternatives. Advantages of shaft and tunnel intakes will be addressed. Design considerations regarding the number, size, location, and constructability of tunnels and shafts for the intake and impacts on pump station design will be reviewed. Additional geotechnical design considerations include proper ground and geologic characterization, considerations regarding soil overburden and site history for locating and supporting the pump station and infrastructure, and considerations regarding rock permeability, rock wall stability, rock excavation and support, and tunnel portal protection will be covered.

Speaker Bio

James Parkes is the Technical Tunneling Director with Schnabel Engineering's Tunnel Business Unit. He graduated summa cum laude with BS and MS degrees in civil engineering from Virginia Tech. He has over 20 years of experience in geotechnical and tunnel design for underground works including tunnels and shafts for water and wastewater infrastructure.

Wednesday, September 1st, 1:00 PM
Isaias Espinoza, Arcadis
Tap Into Your Data To Improve Your Water System Operations

Abstract

Utilities in North America are currently undergoing digital transformation through the implementation of Advanced Metering Infrastructure (AMI). Instead of monthly or quarterly reads, utilities are now accurately collecting high-frequency data, which when tapped into, can support informed decision-making for system planning and operations. Utilities are now looking to tap into the AMI data with robust tools to build more accurate distribution system hydraulic models. Generally, such models are used for high-level operations and planning initiatives. Modelers, planners, and operators can work together to identify and resolve of existing issues. The availability of large, accurate datasets can be a gamechanger for the conventional modeler, and for the utility looking to expand into intelligent water initiatives. Data captured from AMI improves hydraulic modeling by allowing utilities to allocate demand more accurately. Typically, water usage is calculated by applying estimated multipliers based on land use and consumption estimates per capita per day. The aggregate of all demand is then assigned to the closest pipe using GIS and location analyses. This requires extensive QA/QC steps to ensure demand is assigned to the accurate location. AMI data simplifies this process by providing precise measurement and location of water usage across the system. AMI also improves development of hydraulic models is by providing better demand calculation. Hourly interval data will provide the utility the exact water usage at any desired time-period and location. This information removes the need for a utility to estimate peak demand and approximate fluctuations based on assumptions made at the time a model is created. Instead, utilities are able to more accurately tie demands to a meter location and calculate daily diurnal pattern on a minute-by-minute basis. The model then becomes less dependent on assumptions made during model development. Additionally, AMI helps utilities with model development is through improved model calibration. Model calibration requires involved hours-long on-site field work for conducting pressure tests. These tests provide data points that a conventional modeler uses to determine if model represents field conditions adequately. AMI systems capable of capturing pressure data at specific locations across the distribution system can assist in improved model calibration. Using more accurate demands and available pressure data leads to a well-calibrated model, which ultimately leads to improved decision making. This presentation will walk through examples of how a water utility can utilize AMI-collected interval data to improve their hydraulic modeling through better demand allocation, demand calculation, and model calibration. More accurate water distribution models will provide utilities the insight needed to operate the distribution system more efficiently, serve as a foundation to make decisions based on data, and assist in understanding the needs of its staff and customers.

Speaker Bio

Mr. Espinoza is a management consultant at Arcadis focusing on Advanced Metering Infrastructure (AMI) design and implementation projects. He has 9 years of experience, specializing in program management, rate-setting, enterprise resource planning, change management, analytics and data visualization. He has served government agencies, utilities such as WSSC Water, and industrial clients countrywide in various capacities, including the management of enterprise technology solution deployment.

Wednesday, September 1st, 1:00 PM
Mike Bernard, Specific Energy
Flying Blind No More: Using Edge Analytics to Improve Pump Performance

Abstract

Water and wastewater system operators, managers and engineers need a tool to effectively monitor and efficiently operate their pumps. None of us would consider driving a car without a dashboard, and yet our operators "drive" very expensive and complicated pumping systems every day without a proper dashboard. Our managers make asset management decisions based on arbitrary Risk of Failure and Consequence of Failure variables instead of using accurate Return on Investment (ROI) data. Our engineers have to rely on theoretical design conditions because access to real historical data is generally elusive. It is unreasonable to expect any of them to be able to make design changes, operate or manage these systems at peak efficiency, much less optimal performance, when they are all flying blind. This presentation will demonstrate how, with advanced analytics and an operator dashboard, operators can ensure that the pumps are operating within their Preferred Operating Ranges (POR) and maintain peak efficiency. This information allows managers to easily monitor the condition of equipment and make better asset management decisions based on real operational and economic data. Given this data, engineers are able to work with managers and operators to determine if design changes are appropriate, or if maintenance or repairs could rectify a given challenge. Lastly, advanced analytics allow pump stations to save energy and money. This presentation will document several utilities' experience with the Specific Energy Dynamic Pump Optimizer (DPO) on various pumping systems including raw water, membrane feed, high service, and wastewater pump stations. These pumping systems faced numerous challenges from varying conditions caused by pump plugging, equipment deterioration, air binding and in some cases improper design. It is unreasonable to expect operators to operate pumps in these conditions without a tool that not only shows them the condition of the pumps, but also the condition of the piping systems in real time. Our operators are being asked to do more with less every day. They deserve to have a simple dashboard to glance at in order to determine if pumps are doing what they should be doing. The presentation will also show how the same tool generates monthly report cards for each pump in the system. These report cards summarize both the actual loss of efficiency and the loss of productivity for each pump as well as the ROI associated with repairing or replacing the equipment. This data assists managers both with improving their predictive maintenance programs, and with aligning the repair, refurbishment or replacement of equipment with their capital (CAPEX) and operating (OPEX) budgets. Finally, the tool gives engineers easy access to historical data that can be used to select better pumps for any given system, and determine if system conditions have changed due to situations like air binding, sedimentation, or debris accumulation. The presentation shows that a proper application of analytics technology in the realm of water and wastewater pumping exists so that operators, managers and engineers do not have to fly blind anymore.

Speaker Bio

Mike Bernard is Vice President of Business Development at Specific Energy. He is a native of Virginia, and has a Bachelor's of Civil and Environmental Engineering from the Virginia Military Institute. He came to Specific Energy in 2018 after 24 years as a consulting engineer because he believes that this technology has the potential to help operators operate better, managers manage better, and engineers engineer better pumping systems.

Wednesday, September 1st, 1:30 PM
Thor Young, GHD Inc.
Multi-Jurisdictional Pumping Station Consolidation Addresses Environmental Concerns

Abstract

Allegany County and the LaVale Sanitary Commission (LSC) evaluated alternatives for upgrading the sewage conveyance and treatment options for a multi-jurisdictional Project Planning Area which includes the LSC, the County's Braddock Run and Jennings Run-Wills Creek Sanitary Districts, and the City of Frostburg. The existing sewage pumping stations were 45 to 55 years old and in poor condition. Also, critical mechanical and electrical equipment was located below the 100 year flood elevation. In addition, much of the existing pre-stressed concrete cylinder pipe (PCCP) force main installed in the 1960s and 1970s was failing due to corrosion. As a result of this evaluation, a project was initiated to decommission three existing sewage pumping stations and construct a new regional sewage pumping station along with new gravity sewer and force main piping. The new Locust Grove regional sewage pumping station will have a wet well/dry well configuration using a self-cleaning trench style wet well configuration in accordance with ANSI/HI 9.8-2018 design guidelines. The station will utilize three 140 HP 6,100 gpm dry pit submersible pumps. The 1,100 feet of new 30 inch diameter gravity sewer will be installed by microtunneling under the Allegany County Scenic Railroad, US 36, and Will's Creek to allow decommissioning of the existing three sewage pumping stations. In addition, 10,750 feet of the existing 20 inch and 24 inch diameter failing PCCP force main will also be replaced. Several alignment and construction approach alternatives were considered for the force main with the final approach selected through a multi-criteria analysis. The project will allow decommissioning of an existing sanitary sewer overflow at the LaVale sewage pumping station and reduce the likelihood of overflows from the system due to pumping systems failure or piping breaks. The project is being funded by a combination of federal, state, and local funding.

Speaker Bio

Thor has more than 25 years experience in the planning, design, and construction management of wastewater treatment and resource recovery facilities.

Wednesday, September 1st, 1:30 PM

Kegang Wei, University of Delaware

Aquatic uranium removal by amino-functionalized porous silica with customizable pore characteristic --- efficiency and mechanism study

Abstract

The remediation of mine tailing dams is a long overdue problem. Besides the structural failures like foundation subsidence and collapse, the water leaks from tailing dams containing lots of harmful substance such as uranium. According to United States Environmental Protection Agency, uranium occurred in more than 15,000 mine sites located in 14 western states. All over the United States, there are over 28,000 abandoned mines with a uranium concentration as high as 1% in weight, and three-quarters of those abandoned mines need to be investigated and remediated. Considering that nuclear power generation is the key to solve the impending energy and environmental crisis, and uranium is the principle raw material of nuclear power generating, the recovery of uranium from wastewater not only has environmental benefit, but also has huge economic interests. Furthermore, porous silica has the advantages such as adjustable pore size, large BET area, a modifiable surface, renewable and disposable. Therefore, this manuscript uses surface functionalized porous silica as the main material to separate uranium from solution by physical methods. Result shows that 0.1 g sample could quickly remove up to 99.72% uranium from a solution with an initial uranium concentration of 3.0 mg/L at pH 4.0 and ironic strength of 10-2 M KNO3. The result suggests that zeta-potential, specific surface spot and pore size play the most important roles in aquatic uranium removal. Based on the results, the mechanism of aqueous uranium removal by amino-functionalized porous silica also be revealed by this study.

Speaker Bio

Kegang is a PhD candidate from University of Delaware, Civil and Environmental Engineering department. His current research focus is to develop functionalized porous silica for uranium removal from wastewater. Kegang has strong background in mining engineering. He earned his bachelor degree in 2008, Central South University(China). After work on mining company for several years, he achieved master's degree in 2015, University of South China(China). Now he is focus on mine wastewater remediation

Wednesday, September 1st, 1:30 PM
nick lewis, gannett fleming
The Fullerton Project: Constructing 63MG of Finished Water Storage for the Baltimore Water System

Abstract

Baltimore County and Baltimore City constructed three new finished water storage tanks at the Fullerton Site near White Marsh, Maryland totaling 63 million gallons of volume. Constructing these 21 million-gallon water storage tanks was the culmination of a plan set forth over 60 years ago to use the Fullerton site to help improve the finished water supply to the 1.8 million customers in the Baltimore distribution system. Each 300-foot diameter, 40-foot tall prestressed concrete tank incorporates an astonishing 600 miles of prestressing wire and 7,000 cubic yards of concrete, making these tanks some of the largest of their kind in the US. The presentation will focus on the unique and challenging aspects of how these impressive structures were designed and constructed. For example, to minimize the visibility of these massive structures, the County opted for flat slab roofs as opposed to domes. Each 8-inch thick concrete roof slab is reinforced with over 150 tons of steel, requiring 180 interior columns for support. The tanks are also fitted with semicircular, concentric concrete baffle walls, providing each structure with clear well capabilities. The Fullerton Site possesses the largest finished water storage capacity in Baltimore County. In addition to the storage tanks, the project includes over 3,500 feet of large diameter piping and valves up to 84 inches, a 2,000-square foot disinfection building, and nearly 400,000 cubic yards of earthwork. Close collaboration between the owner, engineer, and contractor was key to orchestrating challenging construction sequences such as the four-way piping tie in at the Fullerton Pumping Station. This segment needed to be isolated, cut, dewatered, and the new piping installed, tested, and put back in service in under 28 days to limit the shutdown duration of the 34 MGD station. The presentation will highlight the three-year construction contract and the new perspectives obtained and lessons learned, while incorporating some incredible photo documentation and drone imagery.

Speaker Bio

Nick Lewis is project engineer in the water/wastewater group of Gannett Fleming's Baltimore office. For the past 9 years Nick has provided design assistance for a wide variety of projects, including pump stations, water and wastewater treatment facilities, storage tanks, and transmission, distribution, and collection utilities. Nick is a registered professional engineer in the state of Maryland and currently serves as a trustee for the Chesapeake Section of AWWA.

Wednesday, September 1st, 1:30 PM
Andrew Newbold, Hazen and Sawyer
Managed Aquifer Recharge: An Emerging Integrated Water Management Tool Along the Coastal Plain

Abstract

Wastewater utilities in the Chesapeake Bay Watershed are facing ongoing uncertainty as they plan for future nutrient limits that decrease with no certain end point in sight. At the same time, regulators and utilities are striving to achieve non-point source nutrient reductions through stormwater controls and in some cases federal consent decrees which require comprehensive planning and large capital expenditures. Finally, throughout the coastal plain aquifers of the Eastern United States, regulators and stakeholders are working together to slow the ongoing depletion of groundwater resources like the Potomac Aquifer to protect these resources for use by future generations. Indirect potable reuse in the form of Managed Aquifer Recharge (MAR) is an approach that has the potential to simultaneously address many of these problems and uncertainties facing Chesapeake Bay communities by drastically reducing the amount of nutrients discharged into the bay from POTWs. This significant reduction in nutrients entering the bay has the potential to reduce the need for more expensive non-point source nutrient controls and expensive wet weather sewer capacity improvement projects, all while positively impacting the health of the bay. At the same time, the replenishment of the aquifer with highly treated water transforms the existing finite groundwater resources into a sustainable regional water supply. Indirect potable reuse and MAR still present a multitude of challenges; including public perception, regulatory buy-in, and funding, however many utilities across the country have managed these challenges and are currently operating successful MAR or similar potable reuse projects. This presentation will look at how the case for MAR is developing in the Chesapeake Bay region. We will look at the current water reuse framework and regulatory guidelines in place in Maryland, Delaware, and Washington D.C. compared to additional guidelines in the region and explore the implications of nutrient credit trading. Finally, we will review case studies where MAR has been evaluated or implemented, with a focus on the Mid-Atlantic region. This presentation will update utility managers, planners, and engineers on the status of MAR in the Chesapeake Bay Watershed to inform future planning efforts.

Speaker Bio

Andrew is a Senior Associate with Hazen and Sawyer out of the Virginia Beach office. He has over 15 years of water, wastewater, and water reuse engineering experience. Andrew has a Bachelor's Degree in Mechanical Engineering and a Master's Degree in Environmental Engineering from Old Dominion University. He is a registered Professional Engineer in Virginia and a Board Certified Environmental Engineer.

Wednesday, September 1st, 1:30 PM
Elizabeth Sitter, GHD
Title: Using Technology for Condition Assessments to Promote Safety

Abstract

This presentation will inform the audience of how Unmanned Aircraft Systems (UAS or drones), livestreaming cameras, 360 video cameras, and other technologies can be beneficial for condition assessment as part of an asset management plan. Technical considerations will be discussed, including FAA airspace restrictions, and the types of UAS cameras suitable for various applications. Results for multiple projects will be presented, with a focus on water storage tanks. Drone imagery can be used for condition assessments, support for specialty inspections, and verification of antenna installations, tank security and lighting. Livestreaming cameras and 360 cameras, in conjunction with meeting software can be used to perform remote site visits, allowing real-time access to spaces with occupancy constraints. This presentation is to introduce the audience to ways that technologies that have become more commonplace during COVID can be used to improve safety for condition assessments, allow for real-time feedback, and improve documentation. Emergency management support will be briefly discussed.

Speaker Bio

Liz Sitter is North American Water Transmission & Distribution Service Line Leader at GHD and has 20 years' experience working on water tanks, along with other water, wastewater, and reuse infrastructure projects from design through construction. Liz graduated from George Mason University with a Bachelor's degree in Civil & Infrastructure Engineering. She is a PE in Virginia & Maryland. Liz has worked on over 15 tanks including standpipe, multi-leg, spheroid, fluted columns, and composite tanks.

Wednesday, September 1st, 2:00 PM
Chris Mata, Fairfax County DPWES
When Streams and Sewers Collide: Responding to a Sewer Emergency with a Long-Term Vision in a Short Duration

Abstract
Aging sanitary sewer infrastructure crossing a meandering creek, what can go wrong? A break in that infrastructure in an already difficult circumstance compounded by limited access, a tight rehabilitation design and construction timeframe, and a need for multidepartment coordination, that's what! This presentation is focused on the emergency repair of a sanitary sewer crossing a stream near Martel Place in Fairfax County, Virginia and the accompanying stream restoration. As the stream shifted over time, the sewer main's concrete encasement became covered with sediment while an un-encased segment became exposed. This led to a break in the approximately 123-ft. of asbestos cement gravity main crossing a tributary of the Accotink Creek. Rather than solely focusing on repairing the break, the team kept their aim on the long-term goal of protecting the infrastructure and serving the residents of Fairfax County through both replacement of the entire crossing and restoration of the stream. Since the creek had been meandering, if left un-restored, it would have exposed a separate sanitary transmission main, potentially causing future breaks. The decision was made to make the repair by improving the crossing and restoring the area of the stream adjacent to the larger main for a natural, long term line of defense. This project was a success due to a significant amount of project team and contractor coordination and collaboration around a common goal: long-term asset protection and the need to bring the asset back to service quickly. The break was initially identified in July 2019, and design and construction of both the sewer repair and stream restoration were completed before the end of September 2019, a duration of less than 3 months. This project is a true testament that pressure can be an ally when the whole team keeps sight of the vision ahead. In this presentation, attendees will learn about the challenges and success factors in incorporating long-term thinking around asset protection into an emergency response that used a design-build approach. In our experience, an emergency response effort that goes beyond solving the immediate problem and incorporates long-term planning has until now been relatively uncommon but is becoming the new paradigm at Fairfax County. Additionally, it is very rare in our experience to accomplish the design and construction of both a sewer replacement and a stream restoration/bank stabilization in less than 3 months.

Speaker Bio
Chris Mata is a Sr. Engineer III within Fairfax County's Wastewater Design and Construction Division under the Department of Public Works and Environmental Services, where he manages wastewater collection projects from planning through construction. Chris has been in the water/wastewater industry for roughly seven years. He received his degree in Environmental Engineering from Florida International University. Chris is a registered professional engineer in the Commonwealth of Virginia.

Wednesday, September 1st, 2:00 PM
Paul Deardorff, JMT
Back River WWTP Headworks Improvements: A Project of Large-Scale and First-Time Challenges

Abstract

The Back River Headworks Improvements Project (Headworks Project) is a critical component in the City of Baltimore's comprehensive wet weather management plan with the primary focus being to eliminate sanitary sewer overflows (SSOs) and comply with the Sanitary Sewer Consent Decree. The Headworks Project eliminated a century old hydraulic restriction at the Back River Wastewater Treatment Plant that causes a miles long back-up in the collection system. The design of the Headworks Project began in 2011 and construction began in 2017. Influent flow was treated by the Headworks Facility for the first time at the end of 2020. This presentation will provide a comprehensive summary of the design process; the transition from the traditional design-bid-build model to approval as the City's first construction manager-at-risk (CMAR) project; and the experience of constructing one of the largest construction projects for the City's Department of Public Works. In addition to being the first City's CMAR project, the Headworks Project also experienced many other interesting firsts including construction of the City's largest pumping station with 800 MGD ultimate pumping capacity; mass excavation and concrete foundation construction during the wettest year in Baltimore history; coordination of construction activities during the City's ransomware attack; and managing construction during the ongoing COVID-19 pandemic. The construction of this important project required management of more than 1.4 million construction manhours, an average of $10 million in approved monthly invoices, more than 3,000 submittals, and more than 1,000 requests for information (RFIs). The presentation will be useful to attendees considering alternative delivery procurement methods for design and construction. The presentation will discuss the challenges of implementing a new project delivery method. The presentation will also discuss the benefits to the project that were realized through the cooperative principal that is central to the CMAR delivery method. Finally, the presentation will provide a discussion of the value engineering process that was completed to bring the project within budget goals and the challenge of balancing design goals and construction costs.

Speaker Bio

Mr. Deardorff is a Project Manager with JMT. He is a registered professional engineer with 15 years of experience in the water industry.

Wednesday, September 1st, 2:00 PM
John Boyle, Pennoni
Guilford Finished Water Reservoir Improvements

Abstract

Introduction The Guilford Reservoir was built in 1893 within City of Baltimore limits, in the residential area of Guilford. The uncovered reservoir had a volume of over 36 million gallons (MG) with an overflow elevation 341.1 feet (+/-). The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) was promulgated by the Environmental Protection Agency (EPA) in January 2006. After evaluating various alternatives to reach compliance, the City elected to proceed with design of enclosed tanks to replace the existing reservoir. PRESENTATION The presentation will cover design and construction challenges in meeting the LT2ESWTR requirements on a 100+ year old reservoir in the active Guilford Community. John Boyle and Jeremy Hise are the Engineers of Record with MDE Dam Safety for the design through completion of this project in February of 2021. Working hand in hand with the Guilford Community, during the Community Outreach phase resulted in a design which provided grading to cover the proposed water storage tanks and provide slopes which are aesthetically pleasing to the surrounding communities. The agreed upon design required nearly 40 feet of fill in order to completely bury the tanks. Settlement was expected to be approximately 6 to 12 inches, occurring primarily within the first year following placement of fill. A deep foundation system of 3.5-foot diameter drilled shafts was selected as the preferred foundation alternative to support the tanks and auger cast pressure piles for supporting the connecting piping installed within the footprint of the existing reservoir. Settlement was monitored throughout construction to assess settlement and prevent damage to new infrastructure. The Guilford Pumping Station adjacent to the reservoir had to remain in operation throughout construction, following taking the reservoir offline. To achieve this objective, bypass piping consisting of a 48-inch bypass line connecting to the reservoir feed to the Guilford Pumping Station suction header had to be constructed. This allowed for facilitating staging with the Guilford Pumping Station Rehabilitation Project and the construction of the water storage tanks. Phase I of construction required the Guilford Reservoir to remain nearly full and in-service. However, movement of the embankment during Phase I construction, which was associated with insufficient shoring provided during trench excavation for the construction of the bypass piping, necessitated changes to Phasing leading to the early draining of the reservoir. This change in phasing resulted in the Guilford Pumping Station being supplied from the 36-inch main in York Road, reducing the capacity of the station. Given the possibility for varying subsurface conditions, the Contract Documents required the Contractor to provide additional borings with rock coring at 20 % of the drilled shaft locations. This information and load test results were utilized by the Contractor and Joint Venture Team to develop drilled shaft design criteria for the potential variable subsurface conditions. The developed design criteria enabled the cost of the tank's deep foundation to be constructed approximately $820,000 under budget.

Speaker Bio

Mr. Boyle serves as Municipal Division Manager with an undergraduate from Johns Hopkins University. He has more than 35 years of experience in the design of civil, water and wastewater, and geotechnical engineering projects.

Wednesday, September 1st, 2:00 PM
Jim Kiles, Kamstrup
Rapidly reducing unaccounted for water - Ultrasonic water meters that continually hear, measure and report data on potential leaks that cant' be seen

Abstract
Tools for acoustic leak detection sensors is not a new concept, however, what is new is the possibility to have an acoustic sensor integrated directly into a residential water meter. Meaning, no additional infrastructure is needed to install, maintain or capture data across the smart metering distribution network. The ability to have 24/7 – 365 day monitoring via acoustic leak detection within the pipe allows for a more efficient and cost effective operation. Kamstrup's ALD solution that a utility with nearly 26% unaccounted for water recently piloted integrates ALD capabilities directly into the ultrasonic water meters that are installed in targeted areas within the service area. These meters not only measure accurate consumption and detection of various smart meter alarms, they also monitor acoustic noise levels over time to help identify potential leaks. This kind of data enables utilities to prioritize repairs, maintenance and overall capital improvements. The pilot began late April 2020 with the planned installation of approximately 500 Kamstrup flowIQ® 2200 meters throughout the utility's distribution network. The 15,000 resident utility chose to install the meters in five different target areas where they were replacing old mechanical meters. Installing a comprehensive, integrated-into-the-meter acoustic leak detection solution was a departure from the utility's previous strategy of hiring a vendor to conduct an annual survey of its distribution network – which typically cost around $250,000 annually and usually took about a month to complete with approximately 30-40 leaks identified! Attendees will learn how the technology works, how the project went and the results both short and long term that have benefitted this very 'typical' utility for years to come.

Speaker Bio
Jim Kiles has over 25 years' experience leading teams to design and develop highly advanced enterprise-wide information management solutions for utilities throughout North America. Jim serves as the Southeast Regional Business Manager serving the Chesapeake for the world's most accurate and intelligent ultrasonic water meters with utility side acoustic leak detection.

Wednesday, September 1st, 2:00 PM

Gwen Sullivan, Engineering Design Technologies, Inc.

GETTING THE BIG PICTURE: DIGITAL MAPPING OF PIPELINE CORRIDORS AND THE ASSESSMENT OF ENVIRONMENTAL CONDITIONS AS PART OF A COMPLETE GIS MAP

Abstract

Corrosion science relies heavily on the understanding of the soils and environmental conditions where assets reside. Historically, thick-walled cast iron pipes were the norm, however, as pipelines aged and failures increased, investigations indicated that these failures were a result of poor soil conditions that led to corrosion. This necessitated the development of integrity maintenance protocols to investigate the pipe conditions as related to their environment. Testing soil corrosivity around pipelines helps to predict the stability of the region and the expected longevity of that pipeline. It is a usual practice now, in corrosion industries, to collect soil samples to determine the corrosivity of the environment. Most of the existing soil corrosivity data is collected by corrosion firms or the USDA, who analyze topsoil (not pipe-depth) or vegetation to determine acidity. A more representative analysis of pipeline soil environments would be to collect soil samples from pipe depth and run a series of tests (resistivity, sulfides, chlorides, etc.) to determine soil properties, which are then used in soil corrosivity calculations. Rating systems including the AWWA, WSSC, or any regionally accepted rating system are used to determine soil corrosivity on a scale from mildly – severely corrosive. Once the corrosivity of the soil is analyzed, the impacts on the pipe need to be determined. Thanks to the modernization of pipe location and surveying technologies, there is now an economic option for pipe integrity management to confirm a correlation between pipe failures and corrosive soils. Previously, only land surveyors had the technology to collect this information, but recently more economic high accuracy GPS receivers (+/- 11 inches) were created and have become publicly available. When used by trained geologists and corrosion engineers, these receivers in conjunction with pipeline detection tools, can field-verify the pipe layouts and even generate as-builts that can be easily digitized using Geographic Information Systems (GIS). GIS experts can combine soil corrosivity information into a prediction surface to overlay onto the surveyed pipe layout. This allows pipeline design engineers and asset managers to determine the geographic extents in which pipelines are most at risk with a greater degree of granularity. They can also be used to predict future failures and better organize a methodological utility maintenance plan for small budget contracting companies. These maps provide asset managers with accurate information that will narrow down the management responsibilities to just the areas of concern. By combining environmental characteristics with accurate pipe location information, this technology saves time and money. Included in this presentation will be a case study of a recent 2020 project for Anne Arundel County, Maryland and a reference to work completed for DC WATER.

Speaker Bio

Ms. Sullivan has BS in Geology from the University of Maryland with honors from the Department of Geology Honors Program, Phi Theta Kappa Honor Society and Primannum Honor Society. She also possesses the National Association of Corrosion Engineering (NACE) Cathodic Protection (CP-1) certification. Gwen manages the Soil Laboratory and Field GIS/Mapping services program for EDT and has a NACE CP-1 Certification.

Wednesday, September 1st, 3:30 PM
Vincent Maillard, GHD
One size does not fit all – Finding the right balance in approach to upgrading a sewage pumping station for a small service area

Abstract

As a sewage pump station reaches the end of its useful life, rehabilitation or replacement of the system is necessary to continue to provide satisfactory service to the customers in the sewershed. In most cases, the pump station and associated force main may require upgrades to meet code and current design standards and to improve reliability, safety, accessibility, and working conditions for maintenance and operational purposes. Many municipalities are embarking on multi-year/multi-million dollar programs to address these needs at their existing pumping stations and some have developed standard requirements to promote a level of consistency municipality-wide, which would improve O&M and reduce time and effort during the planning and design phases. However, regardless of the size of the pump station in question, the rehabilitation or replacement of a pump station and its associated components is expensive. This is particularly evident for pump stations serving a small number of customers. Employing alternative analyses and innovation alone may not result in an affordable upgrade project when construction costs are analyzed on a cost per customer served basis. Other factors requiring consideration include lifecycle costs, and non-cost factors such as reliability, impacts to public, easement/property acquisition, safe maintenance access, etc. For projects like these, there very often is a push and pull situation of standard requirements versus capital cost. For stations that may serve less than 100 or even 50 customers, the challenges of providing a safe, reliable, and maintainable station in a cost effective manner that also meets owner standards is difficult to overcome. Very often, a decision of meeting the standard versus meeting the intent of the standard is made. This presentation will review the adaptive planning approach taken for a small sewage pumping station upgrade for a large utility in Northern Virginia. After a significant alternatives evaluation, ultimately, a hybrid approach was taken to balance cost per connection versus standardization. The process also used a set of non-cost factors to rank the alternatives to allow an informed alternative selection for incorporation into the Capital Improvement Plan. Municipalities that struggle with prioritizing their investments into assets that serve a small customer base will learn of the cost reduction options considered for this project and most importantly, the collaborative process that took place within the Project Team to reach an acceptable upgrade solution.

Speaker Bio

Vince is a Principal with GHD and has over 20 years of experience in the evaluation and design of wastewater treatment and collection systems. He is a registered Professional Engineer in MD, VA, and Florida and is a Board Certified Environmental Engineer.

Wednesday, September 1st, 3:30 PM
Sebastian Smoot, HDR
A tale of two pilots: comparing a WAS-only thermal hydrolysis process vs. conventional THP

Abstract
WAS-only* thermal hydrolysis processes (THP) have been implemented in at least six facilities throughout the world—none to date in North America. Recent publications have discussed the benefits of WAS-only THP, and the process can be easily approximated using a theoretical mass balance. However, the authors are unaware of any empirical study that compared a WAS-only THP side-by-side with a conventional THP. In response to this observed gap in research, the authors conducted a pilot study with the purpose of quantifying differences in digester performance, such as biogas production and volatile solids reduction (VSR), as well as end product characteristics—specifically dewaterability and energy content (an important criteria for use of biosolids as a coal substitute), as part of the Baltimore City Comprehensive Biosolids Plan. Biogas production in the WAS-only pilot was 25% lower than that of the conventional THP pilot. The VSR of both pilots have been similar, in the 45-50% range. Biogas characteristics (methane, CO2, and H2 concentrations) have also been similar. Dewaterability of the WAS-only pilot was better than the control, but not as high as the conventional THP pilot. Compared to a conventional THP, WAS-only THP has lower capital and lifecycle costs, less equipment, lower energy demand, and fewer energy and O&M requirements. Preliminary investigations suggest WAS-only THP may also be more compatible with Baltimore City's preference to generate a dried product that could be used as an alternative fuel. Other utilities considering THP may wish to consider alternative configurations, such as WAS-only THP, to determine if the same findings would apply to them. (* Note: "Conventional THP" refers to hydrolysis of all solids—primary and waste activated sludge—prior to digestion. "WAS-only THP" specifically refers to a process where primary sludge is fed directly to the digesters.)

Speaker Bio
Sebastian is a process engineer at HDR with over ten years' of experience in the wastewater industry, with a focus on nutrient removal and biosolids. He loves his home state of Maryland and spreads Old Bay seasoning on his avocado toast. He frequently reminds friends and neighbors that flushable wipes are not really flushable and encourages you to do the same. He obtained a Master of Engineering and Public Policy from the University of Maryland.

Wednesday, September 1st, 3:30 PM
Eric Harold, Carollo Engineers
The Latest in Water Main Condition Assessment Tools & Technology

Abstract

The American Water Works Association (AWWA) M77 Condition Assessment of Water Mains states that "Water main condition assessment currently ranks among the most important subjects to water utilities…" (AWWA, 2019). Historically, WSSC Water has based metallic water main renewal decisions on desktop analyses of break frequency, pipe material, pipe age, and soil corrosivity. To advance its metallic water main condition assessment program (Program), WSSC Water sought to identify cost-effective, proven, and innovative condition assessment tools that increase confidence in pipeline replacement decisions. Although condition assessment tools have been available for decades, it is only in recent years when the industry has seen an increase in the use of different technologies and development of tools to support water main condition assessment programs. For the purposes of describing different technologies and tools utilized in pipeline condition assessment, the term "Technology" refers to the scientific principle behind the operation of the tool, and "Tool" refers to the actual device that is inserted, launched or deployed along the pipeline to collect pipe condition data. There are five non-destructive technologies employed in the inspection of metallic water mains. These are: Magnetic Flux Leakage (MFL), Electromagnetic Technologies (Pulsed Eddy Currents (PEC), and Remote Field Eddy Current (RFEC)), Acoustic and Pressure Wave Propagation, and Ultrasonic Thickness (UT). Most widely water main condition assessment tool vendors include: Pure Technologies (under Xylem), PICA, Hydromax USA, Echologics, MTA Messtechnik, Aquam, Cypress ETI, RockSolid Group, and Applus+. This paper will: (1) Provide a review of available condition assessment technologies and tools; (2) Present a unique Water Main Condition Assessment Technology and Tool Matrix developed to support WSSC's Program; (3) Present a process to use the matrix to support WSSC Water metallic water main condition assessment activities, and (4) Discuss how emerging technologies and tools will be identified and evaluated for future inclusion on the matrix. The Water Main Condition Assessment Technology and Tool Matrix developed for the Program and presented in this paper provides a side-by-side comparison of the different tools available for the condition assessment of metallic water mains. The matrix lists key parameters to short list tools that may be applicable to a specific pipeline under "Tool Selection Phase", and high-level requirements to consider during the planning phase of a condition assessment under "Planning Phase". In all, over 30 distinct water main condition assessment tools were identified and summarized on the matrix.

Speaker Bio

Eric Harold, an Associate Vice President with Carollo Engineers, has nearly 30 years experience in strategic planning, asset management, and wastewater collection system management planning. He has a Bachelor's of Science in Civil Engineering from the University of Cincinnati, and a Masters of Public Policy from George Mason University. He is a registered Professional Engineer in Virginia, Maryland, DC and North Carolina; and is a Board Certified Environmental Engineer.

Wednesday, September 1st, 3:30 PM
Michael Maker, NewGen
System Development Charges: Funding Growth in the Chesapeake Region

Abstract

According to AWWA's 2020 State of the Water Industry Report, the two most important issues facing the industry are "renewal and replacement of aging water and wastewater infrastructure" and "financing for capital improvements". This is certainly true for many of the water and sewer utilities in the Chesapeake Region (Maryland, Delaware and DC). And for communities experiencing significant growth (residential and non-residential), ensuring the availability of water and wastewater treatment capacity will be vital for their future. Ensuring capacity is available and paying for such major capital-intensive projects requires a long-term financial plan to support the economic health of the utility. In order to alleviate the financial burden on current customers, many counties and municipalities look to new customers to pay their fair share for the impact that they put on the water and sewer system, a policy many communities have adopted referred to as "growth pays for growth". One way to allocate growth-related costs to those who cause them is through system development charges (also referred to as "capacity fees", "capital connection charges" or "impact fees" in some Maryland and Delaware communities). System development charges are growth-related charges intended to recover the capital costs of backbone capacity in the water and sewer systems (i.e., treatment facilities and water transmission and sewer conveyance facilities and mains) needed to provide service to new customers. This presentation will discuss several topics pertaining to system development charges in the Chesapeake Region: Background of charges in the State; Industry guidance/best practices for setting fees including calculation methods (system buy-in, incremental and hybrid) and the associated units of capacity and costs of assets; Overview of the various bases upon which fees are charged to customers (fixture units, meter size, equivalent dwelling unit [EDU]) and the pros and cons of each; How to forecast growth-related costs and revenue over time

Speaker Bio

Mr. Maker is an Executive Consultant at NewGen Strategies and Solutions with 18 years of experience in the financial and management consulting industry. Experience includes the development of cost of service cash flow models involving rate and fee design, organizational reviews, benchmarking and customer impact analyses for water, wastewater, stormwater and solid waste utilities. He is a member of AWWA and WEF and a current member of AWWA's Finance, Accounting and Management Controls Committee.

Wednesday, September 1st, 3:30 PM
Russ Dalton, Hazen and Sawyer
Using Geofluvial Principles to Inform the Risk-Based Prioritization of Sewer Stream Crossing Inspections

Abstract

The Fairfax County Department of Public Works and Environmental Services (DPWES) have undertaken an innovative risk-based approach to inspecting and rehabilitating more than 10,000 sewer assets within the stream corridor. DPWES's Wastewater Collection Division (WCD), responsible for the operation and maintenance of the collection system and pump stations, recently implemented a sewer system-wide risk model in InfoAsset Planner. When assessing risk throughout their system, WCD recognized the need to build upon their existing efforts related to sewer assets within the steam corridor. This presentation will describe WCD's innovative approach to developing and implementing their new risk-based Creek Crossing Program. WCD enhanced their understanding of stream location by using a high-resolution digital elevation model derived from LiDAR, leading to the identification of over 9,000 sewer assets within the stream corridor, almost double previous estimates. WCD then developed a specialized risk framework and model in InfoAsset Planner to assess both the likelihood and consequence of failure (LOF and COF) specific to sewer assets within the stream corridor. The LOF criteria were based upon geospatial indicators tied to stream instability to predict the risk of asset exposure through geofluvial processes. The indicators were developed using repeatable GIS analyses, built in Python, to allow for the update of the criteria as more refined data become available. Indicators developed include: lateral bank migration, streambed erosion, mass wasting, and physical attributes of the sewer asset such as age and material. The specialized risk model was used to prioritize assets for field inspection, allowing WCD to focus limited resources on the most critical assets. An innovative, trigger-based data collection methodology was developed using ESRI's Survey123 platform for field inspection of sewer assets at risk of exposure. Values entered in the preliminary fields of the inspection application inform the subsequent data collection needs and guide the inspector through the process. Field data are then used to validate and update existing conditions derived from desktop analyses, refine the risk model, and inform the short and long-term planning of capital projects, operations, and maintenance activities. This is accomplished using specialized decision trees developed for the program. Gravity sewer systems traditionally run along and within the stream corridor. Under typical programs, the focus of risk-based approaches is on the condition of the sewer itself. This program is unique because it incorporates geofluvial factors that help predict the likelihood of streams negatively impacting sewer assets. This approach allows for informed decision making with regards to timelines for inspection and repairs improving the resiliency of the sewer system and can be applied across the United States by municipalities with assets within the stream corridor.

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 is a certified Project Management Professional. He has spent the last 12 years with Hazen and Sawyer, where he specializes in asset and utility management.

Wednesday, September 1st, 4:00 PM

James Peaco, Arcadis-US, Inc.

Holmes Run Pump Station Rehabilitation Design – The BIM Genesis of a Vertical Infrastructure Digital Asset Lifecycle

Abstract

The use of Building Information Modeling (BIM) in building design and construction has become the general standard of practice over the last 20 years; however, its use in vertical infrastructure is much less prevalent. With assets aging and O&M budgets for water and wastewater utilities increasingly strained, the ability to leverage the benefits of BIM and digital asset lifecycle management to more efficiently plan, design, construct and operate facilities is a paramount necessity for the future. BIM implementation for the Holmes Run Pump Station rehabilitation project began prior to design inception with establishment of BIM management protocols in a comprehensive BIM execution plan. Data for the facility 3D design database was captured using LIDAR laser for accessible areas, augmentation with as-built data for inaccessible areas, and incorporation of existing asset data and nomenclature from the Owner's computerized maintenance management system (CMMS). During the design development process, a 3D design intent model was developed and utilized by the Engineer for concept visualization and conflict resolution, then submitted to the Owner at each design phase submission for support with stakeholder visualization, spatial considerations, analysis of alternatives and asset management. During construction, the 3D design intent and asset models will be populated with as-built data by the Contractor and ultimately provide the Owner with an updatable 3D as-built model deliverable that can be incorporated into a future digital asset lifecycle management program.

Speaker Bio

Mr. Peaco is a project manager at Arcadis with 28 years of experience in municipal and federal projects including wastewater, water, storm water and water reuse. His wastewater collection system experienced includes pump station and conveyance system planning; inspection and condition assessment; and, design rehabilitation and construction administration. He holds undergraduate and graduate degrees from Virginia Tech in civil/environmental engineering.

Wednesday, September 1st, 4:00 PM
Greg Knight, Black & Veatch
Thermal Hydrolysis – Lessons Learned from 20 Years of THP Design Integration

Abstract

Although not yet widely adopted in the US, Thermal Hydrolysis Process (THP) technology has been established in Europe now for over 20 years. Over this time, THP technology has been transformed from an emerging technology which required customized design for each facility to an "off-the-shelf" skid mounted package. With vendor provided pre-designed systems there is no requirement for design within the boundaries of the THP system itself, however, there is a range of design, operational and commissioning integration challenges that need to be considered. Based on a history of experience with the design and installation of previous systems including facilities at Dublin Bay Ireland, Cotton Valley UK, Whitlingham UK, Davyulme UK, Medina County OH and Raleigh's Neuse River facility in NC, this paper will provide an overview of some of the design integration lessons that have been learned over the years. The following topics will be discussed: Sludge feed integration, redundancy and shutdown for pressure vessel inspection, energy balance and steam supply, sludge cooling, existing digester integration challenges, sludge rheology, digester mixing and sludge pumping, sidestream management, commissioning. Participating attendees will gain an understanding of the requirements and considerations for implementation of this technology, the challenges with integrating THP systems into the wider wastewater facility and how these challenges may be overcome.

Speaker Bio

Greg is an experienced Process Engineer with 20 years history in the industry. Greg has worked for Black & Veatch for the last 14 years specializing in wastewater and biosolids. His previous roles include Plant Manager of a large potable water treatment plant in the UK and 3 years Voluntary Service Overseas in Ghana (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.

Wednesday, September 1st, 4:00 PM
Burak Kaynak, DC Water
Unique Challenges of Rehabilitation of 66- and 72-inch Water Main in the Heart of Washington, DC

Abstract

DC Water performed an internal condition assessment of the 66- and 72-inch water main located along N Street in Washington, DC. The condition assessment was initiated in 2014 after this water main was identified as a critical main with a high-risk factor of failure. The inspection consisted of electromagnetic inspection, air pocket survey, and transient pressure monitoring. The inspection indicated eleven locations where the water main may need rehabilitation due to the exceedance of a cracking limit. DC Water initiated a design based on these findings; several rehabilitation methods were considered and vetted and rehabilitation utilizing internal carbon fiber reinforced polymer wrap (CFRP) was selected as the preferred method. This rehabilitation method utilizes high strength carbon fibers saturated in epoxy and requires manned entry into the pipe. The lining is designed to meet specific design requirements, such as the required pressure and loading requirements. Each area requires adequate access and ventilation of the pipeline for manned entry. Additional access areas will be needed for water main shut down with double-valve protection to all man-entry areas. Effectively over 28,000 linear feet of water main will be affected by the shutdown; the water mains affected vary in size from 6-inch to 84-inch. In all, shutdown, recharge, and disinfection plans and details had to be developed. Note that this includes over 6 million gallons of water that will be required to complete the required disinfection of the water main. The project is complicated by the fact that the pipeline to be rehabilitated as well as the shutdown areas are located in a busy District of Columbia corridor. Therefore, the coordination with the District Department of Transportation (DDOT) became the critical item for the success of the project. The permitting associated with the project, particularly traffic control, has lessons learned regarding phasing, design, and contractor's means and methods. In addition, DC Water wanted to add the flexibility to the bid documents to allow rehabilitation of five or more out of the eleven locations, mostly due to funding that is currently available. Therefore, the project would allow for the rehabilitation of 5 locations based on criticality. These 5 locations are identified under Base Bid in Schedule of Prices. The pre-construction investigation will include re-inspection of the sites identified in 2014 and ranking them to determine which sites are more urgent for rehabilitation. These 6 alternate bid locations are identified under Alternative Bid in Schedule of Prices. The project will be structured such that Base Bid will allow DC Water to rehabilitate and replace the 5 locations that have the worst condition and still receive bids on 6 alternate locations possible for rehabilitation without any additional negotiations with the contractor. This format sets up a unique and complex bid form and measurement and payment. The construction is slated to begin in mid-2021.

Speaker Bio

Mr. Kaynak is a Licensed Civil Engineer and Project Management Professional, has a master's degree in Civil Engineering, has over 8 years of engineering experience across the water and stormwater industry. He has managed numerous projects from planning to design, as well as bidding and construction. Projects include water piping design, sewer rehabilitation, water pipe replacement, and stormwater hydrology.

Wednesday, September 1st, 4:00 PM
Ziwei He, HDR
Data Informed Policy Making for Septic-to-Sewer Connection Program

Abstract

Anne Arundel County, Maryland (the County) is faced with meeting the Maryland Phase III Chesapeake Bay Watershed Implementation Plan (WIP III) goals for nitrogen reduction. After evaluating an integrated program strategy, a voluntary Septic-to-Sewer program was planned to connect an average of 200 septic users to public sewer per year over 30 years. Previous similar programs have not been successful because they were paid for entirely by homeowners. The County's program team developed a methodology to determine high-value project areas and a modeling framework to estimate County subsidy levels. The model uses public input-based criteria for prioritization and predicts the level of County incentives needed to increase affordability and therefore, chance of program success. The modeling framework starts with prioritization of 87 management areas (MAs). The use of weighted prioritization factors of public health benefit, nutrient reduction, cost, and proximity to existing sewer infrastructure criteria incorporated feedback from a Septic Task Force. Next, a county-wide survey was conducted. The resulting datasets were used to estimate the probabilities an individual in each income level would vote "yes" at varying monthly payment levels. Together with the ranking in the prioritization model, this data was fed into a statistical model using Monte Carlo simulations. This model runs a large number of simulations to produce aggregate results that predict the user monthly payment levels for various percent chances of meeting the nutrient reduction target. In each iteration, the MAs randomly votes "yes" or "no" with varying probabilities based on the aforementioned willingness-to-pay data and average income level of the management areas. MAs vote one at a time, and highly ranked areas vote first, simulating a prioritized program. The model terminates when the nutrient target is successfully achieved. The results shows the monthly payment needed to increase the chance of program success. If a simple majority vote rule (50% +1) is used, the monthly payment for each household should be $90 per month for an 80% chance of success to meet the nutrient goal of 53,000 lb. If a 67% +1 vote rule is used, the monthly payment should be $53 per month for an 80% chance of success to meet the goal. Therefore, the County would need to grant more incentives to encourage more management areas to sign up for the program. These results were fed into the County's financial model to determine debt accumulation for the program duration to perform rate impact and cash flow analyses. The County convened a Septic Task Force and received feedback on program policy and the County's financial commitment. The results were used to inform legislation for the County's subsidy and deferment offerings. These results also informed focus groups that were convened to gauge customer perception about potential program costs. This support empowers the County to most effectively connect septic customers and satisfy long term WIP goals.

Speaker Bio

Ziwei He joined HDR 3 years ago as a Water/Wastewater E.I.T after graduating from Stanford University with a Master's degree in Environmental Engineering in 2018. She performs data analysis and geospatial analysis for projects such as water main construction study, stormwater program management, and septic-to-sewer connection strategic planning. Ziwei also provides support for design and cost estimation for wastewater pump station projects and construction management in Maryland and Virginia.

Wednesday, September 1st, 4:00 PM
Steve Bian, DC Water
Managing Aerial Sewer Crossings in Washington DC

Abstract

Just like an elevated bridge for pedestrian crossing or vehicular traffic flow, all aerial sewer crossings warrant “high maintenance” due to broader exposure to weather and environmentally sensitive settings. Unless the piers of sewer crossing incorporate deep foundations in scour-prone zones as in bridge piers design, its footing could be under designed from the beginning and steadily compromised from constant erosion, resulting in consequential subsidence that may exceed deformation tolerances of the in-situ pipe (VCP, etc.) and its reinforced concrete encasement. When the crossing pipe wall fractures as settlement progresses, sewage will exfiltrate the pipe and seep through and coat the concrete encasement and the concrete piers along its path. Extended exfiltration could exacerbate the corrosion broader and deeper, which in turn leads to significant structural degradation. In this phase the aerial sewer crossing is under nonstop siege from both erosion and corrosion. Erosion and corrosion bear notable similarities: when they starts, they do not stop easily. Erosion gets even worse from record breaking storms and the corrosion runs deeper into concrete surface with consequent spalls, both more visibly identifiable over time when targeted inspecting is implemented as a valid part of asset management. The exfiltration in aerial sewer crossing could flag the owner for its needed upkeep. The engineering of such retrofits of exfiltration demands more discretion to differentiate it from I/I mitigation of the buried sewer in our lessons learned from several recent jobs. The exfiltration could easily be regarded as equivalent to infiltration/inflow (I/I) thus the mitigation could be readily “off-shelf”. An internal CIPP lining could be a simple go-to option for the aerial sewer crossing retrofit for permeability and structural improvement. DC Water experienced mixed results from mitigation with CIPP for graded and aerial sewer crossing, and is ready to share the lessons learned. • A fresh 51” dia CIPP liner to line a graded sanitary sewer breach failed to stop the sanitary seepage and was thus replaced with a sliplined FRP pipe in national arboretum, resulting in an expensive call-back work. • A fresh CIPP to line an encased 12” dia. sanitary serial sewer crossing ended up spall the concrete encasement to the ground, with visible resin spill throughout the concrete encasement. This led to doubts of the long-term permeability of the new liner, resulting in an expensive call-back external wrap work. • An existing 18” dia. CIPP lined aerial sewer crossing with an intermediate in-creek pier developed into a suspended pier of 6-ton gravity load to the sewer crossing, thanks to the repeated concrete filling at the scoured voids at the pier’s in-creek spread footing on decomposed rock bed. The CIPP liner placed in the encased aerial sewer crossing 20-years ago appears to have delayed the comprehensive mitigation for two decades, ballooning a smaller risk to a significant one. This presentation will share our owner’s time-tried failure-success mitigation practices with peers involved within engineering and operations.

Speaker Bio

Steve Bian, PE is supervisor of civil and structural design in DC Water Engineering that covers both vertical and linear assets, with full spectrum engagement of asset management from emergency response, standard development, material selection, CIP. He has been with DC Water since 2005.

Wednesday, September 1st, 4:30 PM
Daniel String. PE, KCI Technologies, Inc
Rehabilitating a Failing 24" PCCP Forcemain with Fusible PVC

Abstract
Kent County Levy Court (Kent County, Delaware) owns and operates a regional wastewater collection and treatment system that serves all major municipalities and several County-owned service areas. In 1974, the County completed construction of Pump Station 2 (PS 2) and the associated 24" Pre-stressed Concrete Cylinder Pipe (PCCP) forcemain to convey flow from the northern part of the County, to the KCRRRF. Over the past 10 years, the County has experienced point failures of this forcemain, which is in the median of a 6-lane section of Route 13 in Dover, DE. These failures have resulted in damage to nearby roadways and properties, requiring emergency repairs of active infrastructure. The project focus area is from PS 2 extending approximately 15,000 LF along the existing forcemain, which conveys wastewater south through the City of Dover. Route 13 serves as the primary route of travel to the State Capital, but this area also contains Delaware State University, Delaware Technical Community College, the Dover Mall, and Dover Downs Racetrack and Casino as well as numerous smaller businesses, schools, and residential areas. The location of the forcemain within the existing median, turn lanes, and travel lanes of this already congested area presented a significant risk of collateral damage due to a failure of the existing pipe, but also significant challenges and restrictions to its renewal and/or replacement. The Project Team considered several options to address the failing forcemain: 1) continued reactive maintenance and repair; 2) replacement with traditional construction techniques (open-cut, jack and bore); and 3) trenchless technologies (slip line). Ultimately, KCI recommended Option 3 which proposed to slipline a rigid PVC pipe through the existing 24" PCCP for its lower overall cost, minimal impact to the surrounding community and businesses, and ease of construction; especially regarding impact to existing utilities. Design phase activities included technical details associated with the sliplining process (including cleaning, CCTV, installation, testing, grouting) and a detailed Traffic Maintenance Plan required to provide safe working conditions for construction, and to minimize impact to the surrounding community. Due to the high visibility of the project and potential impact to major stakeholders within the project limits, the Project Team also developed and executed a formal Public Outreach Campaign designed to keep stakeholders informed and avoid major disruptions to the community and businesses. Conclusion: Sliplining the existing 24" PCCP forcemain with fusible PVC pipe provided a cost effective and expedited solution to replace a failing critical asset and provides longevity for Kent County's existing sewer collections system. The innovative use of fusible PVC allowed for replacement of the existing forcemain though a highly congested commercial area while minimizing disruption to the surrounding community, stakeholders, and events. The Public Outreach program provided a critical communication portal to interested stakeholders, as well as allowing time-sensitive coordination of changing schedule and sequencing due to changing field conditions. Ultimately, the success of the project was a result of creativity, innovation, cooperation, and determination of the entire project team including the Owner, Consultant, Contractor, and Regulatory Agencies.

Speaker Bio
Mr. String is a civil and environmental engineer with 21 years of experience in water and wastewater design in the Mid-Atlantic Region. His project experience includes facility evaluation and planning, hydraulic analysis, water distribution and transmission, wastewater collection and conveyance, pump

station design, water treatment, and wastewater treatment design. He currently serves as Water/Wastewater Practice Leader and the Office Manager for KCI's Dover office.

Wednesday, September 1st, 4:30 PM
Dian Zhang, Stantec
Combining Thermal Hydrolysis and Thermal Drying: Process Optimization, Energy Recovery, and Lifecycle Costs

Abstract
Thermal hydrolysis pretreatment (THP) has been utilized by biosolids management facilities to enhance anaerobic digestion (AD) capacity and energy recovery. When incorporating THP, thermal drying can play an important role if facilities have existing infrastructure, require high biosolids volume reduction, or prefer dried fertilizer product. This case study provides planning and design level insights on driver for a cost-effective integration of THP and thermal drying, with focuses on the impact of THP on dried product acceptance, and alternative energy recovery options. A quantitative model was developed to evaluate lifecycle costs, quantity and quality of dried products for 5 different energy recovery options and under 4 THP and dryer integration scenarios. The model uses conceptual level design to evaluate technologies for different THP and dryer integration scenarios. Results demonstrated that bioenergy recovery from THP-AD is possible to completely offset the energy demand from drying and provide additional beneficial use of the energy including steam generation and combined heat and power. Finally, the model showcases economic justification for optimal process configuration and the energy recovery option. The quantitative model provides a helpful framework to determine the most viable solution for THP integration in drying process and is valuable to utilities and design engineers who are considering THP to maximize energy and resource recovery from biosolids management.

Speaker Bio
Dian is a wastewater and bisolids process engineer at Stantec. He holds a PhD from Virginia Tech and authored more than a dozen peer-reviewed papers related to biosolids management. Key experiences include pilot studies, design, and business case evaluations for anaerobic digestion, thermal hydrolysis pretreatment, biosolids dewatering, and energy recovery.

Wednesday, September 1st, 4:30 PM
Tiffany Harrison, Gannett Fleming
Securing Water Service for a Maryland Community's Future

Abstract

The Baltimore County Department of Public Works (DPW) embraced a proactive and innovative approach to create a redundant water supply line servicing neighboring Howard County by way of a 70-year-old service line. By doing so, the DPW secured a reliable water source for Howard County. While designing upgrades to the Catonsville Pump Station, Baltimore County took the opportunity to construct 2,800 linear feet (LF) of 36-inch redundant water main to sustain service to Howard County. This strategy optimizes operational flexibility, particularly when repairs are required on the existing service line. The new pipeline is nearly 15-feet deep and passes through a busy urban intersection along historic Route 40. Typically, water mains are replaced or repaired only after a failure occurs. Breaks not only waste millions of gallons of treated, clean drinking water, but can also cause flooding and damage to homes and businesses. DPW's vision for a secondary pipeline safeguards the public from experiencing the inconvenience of a water supply failure and sustains the community's essential drinking water well into the future. Proactive planning and forethought set the project in motion. A critical goal of the project was to integrate the new main while minimizing service disruptions, by connecting the new main into the existing pipeline. Since the Catonsville water main is the major supply line that feeds all of Howard County, Gannett Fleming had the difficult task to maintain uninterrupted service for Howard County. The innovative plan involved lowering internal pressures inside the existing 48-inch main and using hot-tapping connection to connect the new main to the existing main without shutting off the water supply. One of the major challenges to make the 48-inch connection involved the stringent regulations from Maryland State High Administration (SHA). SHA required this work be performed overnight between the 9 p.m. and 5 a.m. to minimize traffic disruptions and protect the integrity of the Route 40. Interagency collaboration was essential to this project as Baltimore County owns the water supply main, the City of Baltimore maintains it, and Howard County uses it the water. The design engineer joined forces with the contractor, Baltimore County, Howard County, and Baltimore City to closely monitor valves and line pressure, and complete linestop and tapping operations. This interagency collaboration demonstrates how engineering professionals can come together to protect a vital resource and sustain a community.

Speaker Bio

Tiffany Harrison is an engineer in global infrastructure firm Gannett Fleming's water/wastewater division. With 13 years of experience, she has worked on several sanitary sewershed studies and rehabilitation efforts, Miami Dade County's consent decree program management, and is currently involved with water and sewer designs for Virginia American Water and the City of Baltimore, respectively.

Wednesday, September 1st, 4:30 PM
Edward Shea, HDR
Anne Arundel County's Integrated Management Approach to Long-Term TMDL Compliance

Abstract

Anne Arundel County, Maryland is navigating a challenging set of both regulatory and non-regulatory requirements to comply with the Clean Water Act and Maryland Chesapeake Bay TMDL goals. Preliminary estimated costs to meet the targeted nutrient reductions from the septic system sector approached $1.5B, in addition to programs for ENR and MS4 compliance. By taking an integrated planning approach, the County demonstrated that it could achieve nutrient reductions through a combination of strategies. This approach is projected to result in over $700M in estimated savings. Eight diverse and feasible technical solutions were evaluated, including Managed Aquifer Recharge, Septic Conversions, Minor System Upgrades, Cluster Treatment, Nitrogen Reduction Units, Septic Tank Effluent Pumping, and Oyster Aquaculture. These technical solutions serve as the building blocks of Management Strategies. Each option was evaluated in terms of benefits, policy considerations, funding considerations, public engagement issues, costs, risks, and operations and maintenance considerations. Nineteen Management Strategies were assembled using combinations of technical solutions covering a time period of 30 years. Since Managed Aquifer Recharge and OSDS Conversions were the two options with the most potential nitrogen reduction benefits, they made up the backbone of the program. The OSDS conversion component was then prioritized according to cost, proximity to existing sewer infrastructure, nutrient reduction, and public health benefit. Through additional workshops, the group further narrowed down the options to three Management Strategies based on a desire to balance the various risks and challenges. Each strategy offers a similar level of stormwater restoration, Nitrogen Reducing Unit upgrades, and Private Treatment Plant Upgrades; while including alternate levels of Managed Aquifer Recharge implementation and OSDS conversions. The integrated planning approach used by the County was successful in identifying and narrowing down a wide range of alternative approaches to meeting regulatory requirements. The resulting shortlist of alternatives offers a starting point for developing implementation plans and collecting public input to garner support and address concerns with the proposed management strategies. The County is moving forward with development of the OSDS connection program. This includes drafting policies and procedures that define program implementation, and a robust public outreach campaign. Additionally, based on the shortlisted management strategies, a final Integrated Management Plan (IMP) will be developed to guide the County's approach for meeting Phase III WIP requirements in coordination with long-term system improvements. Development of the final IMP will follow EPA's Integrated Municipal Stormwater and Wastewater Planning Approach Framework. The IMP will be used to develop a prioritized and balanced infrastructure investment strategy that addresses the Clean Water Act and Chesapeake Bay TMDL requirements and meets programmatic and capital wastewater needs across the service area over the next 30 years.

Speaker Bio

Mr. Shea is a Utility Management Services manager with HDR, and has more than 20 years of experience serving water, sewer, and stormwater utilities to solve complex design and management challenges. He earned B.S. and M.S. degrees in Civil & Environmental Engineering from Virginia Tech, and an MBA from

George Washington University. Mr. Shea volunteers with CWEA as a member of the Asset Management Committee and the Technical Education Committee.

Wednesday, September 1st, 4:30 PM
Tamrat Bedane, Dc Water
DC Water's Asset Registry: Mapping Service Line and Sewer Lateral using Trimble Technology

Abstract

DC Water's Asset Registry: Mapping Service Line and Sewer Lateral using Trimble Technology Abstract: DC Water owns and manages over 130,000 customer service connections – both water service lines and sewer laterals. Currently, less than 30% of the service lines and sewer laterals are registered as linear assets in DC Water's systems of record. Having location information of meters, curb cocks (curb stops), and clean outs while representing them in a Geographic Information System would assist in the management and operation of the assets. Performing flushing, emergency main shutoffs, pipe condition assessment, meter replacement, sewer lateral cleaning and other tasks, requires an understanding of meter and clean out location and provides operational efficiency. The effort includes: collection of GPS coordinates of meter pits, curb cocks, and sewer clean outs using Trimble GPS where they are visible from the surface. In addition, using a custom generated Trimble Unity form, the general condition of the assets was collected. In Fiscal Year 2018, three pilot locations were selected. The objective of the pilot was to evaluate the accuracy of the method as well as to evaluate resources required. The criteria in selecting the pilot locations were based on criteria such as residential neighborhoods with canopy cover, residential neighborhoods with little canopy cover, and commercial districts with taller buildings. Upon successful completion of the pilot effort, nearly 1,000 customer connection points were collected and processed in Fiscal Year 2019. The primary purpose of this presentations is to lay out methodology employed and share lessons learned of using Trimble GPS for asset location information and condition assessment. Where accuracy was deemed acceptable, the data points were used to create service lines and sewer laterals assets in DC Water's system of record. FY18 locations & results: Location 1 -Bryant St: north side of buildings, medium tree cover, no leaves, overcast day. 40 points captured, 24 of which were RTK Float, 13 DGPS, 3 SBAS. Most satellites: 21. Least satellites: 5. Average satellites: 11.35. Worst and best horizonal accuracy of 93.11" and 2.76" respectively. Location 2 - Adams St: south side of buildings, light tree cover, no leaves, cloudless day. 67 points captured, 55 of which were RTK Float, 12 DGPS. Most satellites: 14. Least satellites: 5. Average satellites: 9.61. Worst and best horizonal accuracy of 68.38" and 2.75" respectively. Location 2 - Howard University: multiple sides of buildings, light tree cover, no leaves, cloudless day. 18 points captured, 15 of which were RTK Float, 3 DGPS. Most satellites: 14. Least satellites: 5. Average satellites: 10.17. Worst and best horizonal accuracy of 58.37" and 2.76" respectively. FY19 location & results: Taking lessons learned from Fiscal Year 18 pilot effort, the smallest Pressure Zones in the system, 16th & Alaska 4th High, was selected to complete data collection and processing for Fiscal Year 19. Information identified for collection includes asset type, its address, location coordinates, distance above/below grade, and condition. Summary of the accuracy result is presented below. Worst and best horizonal accuracy of 35.75" and 2.76" respectively.

Speaker Bio

Mr. Bedane is responsible for managing water distribution assets. In this capacity, he is responsible for performing hydraulic modeling, asset condition assessment, asset rehabilitation/replacement, asset registry and updates and water system data analytics. Mr. Bedane graduated with BSc in Civil Engineering is from Mekelle University, Ethiopia and MS in Water Resources Engineering from University of Brussels, Belgium. Mr. Bedane is registered professional engineering the District and Virginia.

Thursday, September 2nd, 8:30 AM
Anthony Elberti, Gannett Fleming
Delivering a Maximum Value in a Compact Footprint: CDCA's 24 MGD Self-Cleaning Wet Well Pump Station

Abstract
From REVIT to reality, see how the Central Delaware County Authority delivered a 24 MGD self-cleaning wet well pumping station while keeping their existing 16 MGD pumping station in operation on the same parcel. In addition to providing additional capacity, this pumping station needed to be able to meet a future pumping conditions. The existing pumping station is situated between two different sewer service areas and as a long-term strategy of integrating this station better, the pumping station was designed to eventually connect directly to a future force main which has much higher frictional head. Pump selection, hydraulic modeling and transient analysis were critical design components. The innovative self-cleaning wet well design reduces overall operations and maintenance costs, while a core commitment to safety embedded in the design protects operators over the lifetime of the station. A carefully crafted maintenance of operations plan was developed to maximize use of the existing pumping station, which limited costly bypass pumping. Follow us on the project journey that included the evaluation of various alternative analyses, such as conventional vs. self-cleaning trench wet well designs, grinders vs. mechanical screens, and various other structural options. With a keen awareness of SCADA needs, the design team delivered a system that has the flexibility to integrate with surrounding authorities in the future, while operating as a standalone pumping station. As if delivering the project on the extremely small site wasn't challenging enough, work restrictions due to COVID-19 and flood conditions threatened the timely delivery of the authority's flagship project. Yet project was successfully delivered on time and under budget. The Crum Creek Pumping Station stands as a testament of teamwork, resourcefulness and experience. Specific content that will be covered in this presentation: Evaluation of conventional submersible wet well vs. self-cleaning trench wet well design Illustration of some of the design challenges and how they were mitigated through 3D design (using Civil 3D and collision detection in Revit) Construction challenges and how they were resolved Utilizing 3D scanning to document as-built conditions Overall lessons learned

Speaker Bio
Mr. Elberti is a Senior Associate with Gannett Fleming. He has 20 years of experience in wastewater process, collection and conveyance design, permitting, piloting and construction. Mr. Elberti holds a BS from Penn State University in Civil and Environmental Engineering and a MS from Villanova in Water Resource Management. He is currently serving as the Technical Working Group Leader for Wastewater Process.

Thursday, September 2nd, 8:30 AM
Eric Li, BDP EnviroTech LLC
The Most Comprehensive Study by IRSTEA/INRAe' on BDP's advanced technology of Low DO and High Efficiency of Biological Nitrogen and Phosphorus Removal

Abstract
Presentation Body BDP® held an authoritative research with IRSTEA (French National Research Institute of Science and Technology for Environment and Agriculture), now merged as INRAE (French National Research Institute for Agriculture, Food and the Environment) in France. The technical approach of this project is based on a full-scale package treatment system in INRAE's testing site in the City of Lyon, France. This treatment system is able to treats 91,000 m3 (24 MGD) of wastewater per day. Built in 2011, the WWTP started to treat urban water in Lyon and then discharge into the River Rhone in compliance with European standards. The study started in 2019 and will continue conduct further studies into 2021 and 2022, researching and analyzing the microbiological and biological as well as chemical components on the full scale SND/low DO environment, more importantly analyzing the outcomes of nutrient removal, energy savings and operating benefits for end users. Parallel, the team will conduct analysis in the city of Rialto, CA, USA with a nearly complete 200,000g/d full-scale wastewater treatment plant to support the research program in France. In December 2020, Vinci Construction Group and INRAE published an article about this advance process introducing the nitrogen removal in wastewater by SND in low aerated environment in an authoritative water resource magazine in Europe. BDP® Process has been adopted by more than 54 wastewater treatment plants worldwide, with projects ranging from industrial wastewater to municipal sewage applications including both small (<0.5 MGD) and large scale (53 MGD) systems. Goal of the Presentation Our goal is to share the research which is the most promising intensive and efficient low-energy nutrient treatment process(es) and innovative process control approach(es) held by French national institute with BDP® process. Benefit of the Attendees The benefit of the attendees is specifically geared solving nutrient problems in the Chesapeake Bay region. The research conducted as shown a simultaneous nitrification/denitrification (SND) process in all-in-one basin, with characteristics of low dissolved oxygen (DO), high mixed liquor suspended solids (MLSS) concentration, high efficiency on nutrient removal, low energy consumption, smaller footprint, less waste sludge output, and evenly distributed aeration technology, unique clarification section, as well as unique hydraulic circulation technology.

Speaker Bio
Eric Li is the key inventor and CEO of BDP® wastewater treatment technology. He has 15 years of experience in charge of research and development of wastewater treatment and recycle water technological development. He managed over 54 full-scale applications of BDP technology in Europe, China, U.S. and Taiwan.

Thursday, September 2nd, 8:30 AM
Mike Ward, Henry County PSA
Managing Underground Linear Assets using The Utilis Satellite Based Leak Detection Program

Abstract

The Henry County Public Service Authority is a public body organized and created by the Henry County, Virginia Board of Supervisors in 1965 whose purpose is to acquire, construct, improve, extend, operate, and maintain a water and sewage disposal system. The Authority's infrastructure assets consist of one water treatment plant, approximately 374 miles of water lines. There are 12,200 water service connections and the authority delivers and average of 3.3 MGD. Non-revenue water has been increasing at 25% per year since 2016 and is currently approximately 30%, or, 1.1 MGD. Henry County is seeking to deploy programs that will reverse the NRW loss upward trend they have been experiencing and reduce non-revenue water levels to 15%. Toward that end Howard County PSA has retained the services of Utilis to provide satellite imagery of their service area to identify likely pipe leaking locations. Utilis surveys that area of interest with synthetic aperture radar (SAR) and collects the backscatter signals. These signals are analyzed by their propriety algorithm to produce a GIS based map showing the areas that should be physically inspected by boots-on-the-ground (BOTG) field leak inspectors. Henry County utilized the services of Utilis in 2019 and 2020 and found a total of 150 leaks. These leaks amounted to 570,000 gallons per day of real water losses. Identifying this much real water loss effectively reversed the increase in NRW percent system wide. NRW actually dropped in the year following the service being performed, thus amounting to a NRW loss reduction of over 30%. Due to the fact that Henry County keeps excellent and detailed monthly records of water delivery, sales and water losses the impact of the Utilis service program can be codified. This case study will review the work performed pursuant to the Utilis program and the effect it has had on Henry County both financially and from a real water loss reduction perspective.

Speaker Bio

Michael Ward is the Director of Regulatory Compliance & Technical Applications at the Henry County Public Service Authority since 2001. Prior he worked at the City of Clinton in North Carolina from 1994-2001. He is a Professional Engineer in the Commonwealth of Virginia and has a Class I wastewater operator license. He graduated from Virginia Tech with a Master of Science in Environmental and Water Resource Engineering (2011) and a B.A. Environmental Science from NC Wesleyan College (1994).

Thursday, September 2nd, 8:30 AM
Pratik Desai, HDR, Inc
Federal funding supporting local priorities: Case studies involving Chesapeake Bay TMDL and Resiliency

Abstract
Under Section 22 of Water Resource Development Act (WRDA) of 1974 (PL 93-251), United States Army Corps of Engineers (USACE) can provide states, local governments, other non-federal entities, and eligible Native American Indian tribes assistance in the preparation of comprehensive plans and technical assistance in support of water and related land resources.. This is generally referred as Planning Assistance to States (PAS) program. The needed planning assistance is determined by the individual states and tribes and these studies are undertaken at a planning level and detailed designs are not involved. In this presentation, funding opportunities for state/local governments and other non-federal entities will be presented. USACE has the ability to cost-share 50%-50% with the local sponsor to perform such PAS studies. Following are few example where PAS studies have been performed for local municipalities. These studies are helping municipalities comply with Chesapeake Bay TMDL requirements and coastal resiliency needs. The technical assistance was completed by USACE-Baltimore District in partnership with the local sponsors York County Planning Commission, Wyoming Valley Sewer Authority, and West Goshen Township, PA. The technical assistance included conducting an assessment of the MS4 stormwater infrastructure and confirmation on conductivity of the stormwater outfalls and infrastructure (inlets, manholes, channels, and pipes). Technical assistance was also provided in developing of ESRI database to store stormwater datasets and other related spatial information to meet Chesapeake Bay TMDL compliance requirements. The Many Mind Creek Planning Assistance to States (PAS) Study was completed by the USACE, New York District in partnership with the study sponsor the Borough of Atlantic Highlands, New Jersey. The goal of this study was to improve coastal resiliency within the Borough of Atlantic Highlands, NJ and identify areas along Many Mind Creek that are prone to coastal or riverine flooding. Areas experiencing severe stream bank erosion, sedimentation, or flow constrictions were identified and possible solutions for these problems were described in the study.

Speaker Bio
Pratik is Regional Stormwater Lead at HDR with over 17 years of planning, design and management experience on a variety of Stormwater Management (SWM) design and permitting, flood risk management, and site/civil design projects. He has extensive experience with stormwater planning and design, Erosion and Sediment Control (ESC) design, and MS4 permits in multiple states within the United States. He is a Professional Engineer, Certified Floodplain Manager and Envision Sustainability Professional.

Thursday, September 2nd, 8:30 AM
Michael Mulcare, Mott MacDonald
Merging Bottom-up Transformation with Top Level Asset Management Strategy… a Case in Organizational Change Management

Abstract

Mount Pleasant Waterworks provides drinking and wastewater services to over 90,000 customers in the Charleston, SC suburb community of Mount Pleasant. Following reorganization in 2017 and adoption of its current strategic plan, MPW launched an initiative for develop a fully integrated asset management program. The objectives were to deliver services effectively and efficiently, incorporate better condition and performance measures, ensure all lifecycle costs are captured and understood, and improve resource use accountability . Applying a holistic approach to the program, the combined effect of these individual outcomes would be a data driven organization making better life-cycle decision. However, asset management change programs often fail to deliver all the desired outcomes, which jeopardizes the long-term effectiveness of the program. This is due to a combination of overreach, misaligned sponsorship, inadequate resources, poor change planning and management, and/or lack of staff engagement and participation. MPW recognized that asset management is a technical topic implemented by people within an enterprise architecture. Consequently, people would be central to the success of the program. As a starting point, a gap analysis based best practices from ISO 55000 and Institute of Asset Management was performed that directly engaged almost 40% of the staff across all departments including technical services, operation, human resources, finance, field service, and customer service. Results from the gap analysis provided a baseline against established asset management frameworks on which to structure the asset management change effort. This shaped top-down strategy for systematic program enhancements in areas of work management, materials management, reliability engineering, and capital delivery. The top-down strategy provided coherence to the interconnected natures of holistic asset life-cycle management. While the top-down strategy provided a roadmap, implementation requires people to deliver the changes. Lasting change requires engagement and commitment from many stakeholders at all levels of the organization, particularly those who's daily routine most directly touches the assets. For this reason, implementation of program enhancements rested on working teams structured to ensure cross-functional dialog and bottom-up transformation. Six teams were chartered. Five teams focused on technical elements of the program. These teams were given responsibility to identify, prioritize, plan, and execute changes in their respective areas. The sixth team, Leadership & Change, provided oversight to the other teams to ensure alignment to strategic objective, drive organization change management activities based on Proci® principles, and provide liaison with the steering team and executive leadership. These teams have broken down silos, increased accountability, implemented various enhancements (e.g. pumping), and continue to transform MPW.

Speaker Bio

Mike is Mott MacDonald's Smart Infrastructure Leader based in Arlington, VA. He has extensive experience with enterprise asset management, instrumentation, condition monitoring, and leading of multifaceted engineering and IT projects. His undergraduate from Georgia Tech is in electrical engineer. He has a Master of Arts in Finance from Harvard and MBA from MIT. He has over twenty-five years of

experience in process engineering, instrumentation & controls, maintenance, and program management.

Thursday, September 2nd, 9:00 AM
Jay Boyd, ADS Environmental Services
How the COVID-19 Challenge Illuminated Opportunity Transformational Change with Collection System Maintenance

Abstract

COVID-19 (CV19) has brought historic and fundamental disruption to our lives and work. Wastewater collection systems operations, being part of the essential industries1, have faced exceptional challenges with staffs maintaining regular schedules while implementing new procedures for enhanced personal protection against infection. With utilities putting safety first, various forms of staff rotations were implemented such as working alternating days or weeks, thus reducing person-to-person contact. Yet, these measures reduced maintenance capacity2 affecting essential routines such as cleaning. The early days of the pandemic brought a significant increase of sewer-unfriendly objects appearing in the collection system. “Flushable” wipes, face masks and latex gloves accumulated in collection systems from residential toilets increasing blockages and fouling pumps, making national news3. O&M staff could not anticipate these sudden and unexpected changes, compounded by limited staff availability, this clouded the picture to prioritize maintenance for where and when to clean. More than 80 utilities across the US with existing flow and/or level monitoring networks were enrolled in a program that added new, predictive software to detect very early stage developing blockages. This Internet of Things (IoT) architecture used continuous flow and/or level monitoring where data was sent to cloud-based software. The software employed machine learning-based analytics that predictively identified early-stage blockage development and enabled prioritization of locations needing maintenance. This gave up to weeks-worth of advanced notice, essential for utilities struggling with limited O&M resources. From April to October 2020, 53% of all participating utilities received at least one notification of an issue that, when investigated, a developing blockage was found and cleared4. Additionally, no SSOs at any monitored sites occurred during this time. Beyond SSO prevention, some utilities creatively applied this predictive IoT technology to determine when to clean. They hypothesized that scheduled cleaning, without the knowledge of actual site conditions, can result in cleaning already clean pipes. To gain site-condition information, utilities used IoT technology to determine when to clean. Three studies showed that with IoT technology cleaning reductions of 80% to 87% were realized and with no SSOs. This relieved pandemic-induced O&M pressures. Moreover, IoT technology can fill resource gaps beyond the extremes of the pandemic, such as budget constraints. Three case studies are presented that document and tabulate cleaning reductions, SSOs prevented and corresponding savings. Furthermore, these results strongly support the case for employing IoT-based cleaning protocols returning the benefits of lower O&M stress while increasing productivity and eliminating SSO threats.

Speaker Bio

Jay Boyd - ADS Market Dev. Dir. 39 -years’ experience developing technology solutions for water/industrial markets. Education: Bio. BA, bus. & tech. graduate studies, two Dale Carnegie® Instructor certs. Speaking: 30+ national/state conferences Publishing: WE&T, MSW, Water/Wastes Digest, WaterWorld, I&I, Pumps & Systems, ES&E on subjects including Cleaning Optimizing, I&I Assessment, Water Internet of Things, and Odor Control. Memberships: WEF, WEF Intelligent Water Tech. Committee and CAWEA.

Thursday, September 2nd, 9:00 AM
Tanja Rauch-Williams, Carollo Engineers
Presentation Title: State-of-the-Art Suboxic Nitrate and Phosphorus Removal Treatment in US Cold Climate BNR Facilities

Abstract
Warm-weather biological nutrient removal (BNR) facilities in the Southeast of the U.S. commonly operate with simultaneous nitrification and denitrification (SNDN) and achieve ultra-low effluent total nitrogen (TN) concentrations. Less is known about the few facilities in cold weather climates in the U.S. that have accomplished ultra-low effluent TN concentrations of less than 3 mg-N/L and phosphorus removal of less than 0.5 mg/L year-round at dissolved oxygen (DO) concentrations not exceeding about 0.5 to 0.7 mg/L in the aeration basins. The performance achievements of these facilities put several traditional credos on BNR design and operation into question: • Nitrifiers can achieve full nitrification at DO concentrations well below 1 mg/L even in cold temperatures. • Phosphorus accumulating bacteria (PAOs) do not seem to need high DO concentrations for effective ortho-phosphorus uptake. Lessons learned from these facilities highlight the relevance of aeration control accuracy, and a slow and steady DO acclimatization to adapt the BNR biomass community to suboxic conditions. This presentation will describe facilities with different process configurations achieving ultra-low nitrogen and phosphorus removal at wastewater temperatures as low as 10 degrees Celsius. This presentation has two objectives: 1. Discuss facility examples and summarize lessons learned for operation and design. 2. Critically examine nutrient removal processes in these facilities.

Speaker Bio
Dr. Tanja Rauch-Williams serves as Carollo's Wastewater Process and 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, codigestion, resource recovery, energy optimization, and trace organic removal. Tanja is a member of LIFT's Steering Committee and serves as the second vice-chair of WEF's Municipal Resource Recovery Design Committee.

Thursday, September 2nd, 9:00 AM
Fikremariam Tesfai, DC Water
Proactive Flushing of Water Mains to improve Disinfectant Residual and Mitigate Water Discoloration

Abstract

DC Water's distribution system stretches for 1,300 miles with 53% of the mains being unlined cast iron. Unlined cast iron, which is prone to corrosion, creates chlorine demand and loss of disinfectant potential that could pose public health concern. These iron corroded mains are cause discolored water. Since 2018 DC Water has been conducting a summer flushing program to proactively test and flush areas that could potentially have poor water quality. The program identified that the frequency of water turnover required to maintain water quality varied between locations and provides water quality data with flushing duration to optimize the future flushing procedures. In 2018, flushing locations were selected based on the distribution system configuration and hydraulic modeling; locations include pressure zone boundaries, areas adjacent to parks and other geographic boundaries, and neighborhoods with low water use. From the hydraulic model, the average water age of these hydrants was 3.3 days and ranged from 0.7 to 26.5 days. In 2019, locations were selected based reported broken valve in the distribution system and on poor water quality that were identified during 2018 flushing program. In 2020, hydrants selected were mainly located at pressure zone boundary and dead-end mains. Water was run from hydrants through a 2 ½" nozzle with a tap attached to it followed by water testing for iron and chlorine residual after 5 minutes of flush using HACH field testing method to establish baseline data. Subsequently, all hydrants were flushed for 10 minutes at full flow through the other 2 ½" nozzle with a diffuser attached and again tested for chlorine and iron. If target levels are not met, flushing continues for additional 10 min followed by testing. Flushing continues until target levels (1 mg/l for both chlorine and iron) are met with a maximum flush duration of 30 minutes. In 2018, results show that 70% of the 376 hydrants tested met iron and chlorine targets after 10 min flush, 87 % met target level after 20 minutes while 93 % met target after 30 minutes flush. In contrast, in 2019, 62% of the 197 hydrants met target levels after 10 min flush, 81 % after 20 min and 91% after 30 min. In 2020, 65% of the 200 hydrants flushed met iron and chlorine targets levels after 10 min of flush while 83 % and 89% met target levels after 20 minutes and 30 minutes flush, respectively. The average chlorine of all the hydrants flushed after 10 minutes in 2018, 2019 and 2020 was 2.4, 2.2 and 2.3 mg/l, respectively. The program helped to enhance awareness on the water quality conditions at these low water use sites. Moreover, it helped to identify locations susceptible to low chlorine that require regular flushing and monitoring. In our final presentation we will address (i) if there is any quantitative correlation between the overall customer complaint decline and the proactive flushing programs and, (ii) whether there is any improvement in water quality within the flushed area followed by the summer flushing program

Speaker Bio

Fikremariam Tesfai has a Bachelor of Science in Chemistry from University of Asmara, Eritrea; and a Master of Science in Sanitary Engineering, majoring in Water Supply, from IHE, Delft The Netherlands. Tesfai has been working in DC Water as Water Quality Specialist, since 2015, coordinating various water quality projects.

Thursday, September 2nd, 9:00 AM
Stephen Tursi, Jacobs Engineering
DC Water's Green Infrastructure Design Challenge Parks Project

Abstract

In April 2013, DC Water launched the Green Infrastructure (GI) Challenge, engaging firms to design innovative green practices that absorb stormwater. These GI practices are designed to capture runoff before it can enter the combined sewer system, which will aid in significantly reducing combined sewer overflows (CSOs) in a cost-effective manner in the District of Columbia (DC). Jacobs was selected to design two GI projects in "triangle parks," which in DC are the often-underutilized existing green spaces that result from the combination of diagonal avenues and perpendicular street grid. Jacobs' GI Challenge submission focused on an overarching vision to re-purpose these triangles to provide more usable green spaces that enliven communities while simultaneously enhancing water quality in the District. The designs for the two triangle parks in the Brightwood Park urban residential neighborhood within the Rock Creek Sewershed will be presented, along with the outreach process that was included. The approach and methodology is directly responsive to DC Water's desire to re-purpose the 'triangles' as community assets that achieve CSO reductions while emphasizing revealed stormwater processes. The design team considered site constraints, neighborhood character, goals of other DC agencies, and possible benefits to be gained. Our concepts reflect the integration of stormwater management features and aesthetically pleasing functionality. In collaboration with WRT, site specific designs were developed with concepts that are intended to include typologies that could be replicated on a larger scale for a citywide "green triangle" program, demonstrating a transformation of underused public spaces into areas that help manage surrounding right-of-way runoff in a cost-effective manner, thereby reducing CSOs, and delivering associated community and economic benefits. The first triangle park at Kansas Avenue and 2nd Street NW is estimated to capture the runoff from a 1.2-inch storm from 1.4 impervious acres. Stormwater enters the proposed design via trench drains that convey runoff into a decorative cobble channel. The stormwater then flows along the channel into a rain garden and subsurface infiltration bed. Additional street runoff is captured in two vegetated curb extensions, which also help buffer the new park space and provide traffic calming functions. New park amenities will include a flexible open lawn space, seatwalls, informal play elements (boulders and logs), attractive plantings, and enhanced tree canopy. A few blocks south, the proposed design for the second triangle park at Kansas Avenue and 3rd Street NW features a similar material and plant palette as Kansas and 2nd. The site captures the runoff from a 1.2-inch storm from approximately 0.71 impervious acres. Stormwater flows from adjacent streets into the site via decorative trench drains and enters a decorative cobble channel. The channel conveys the runoff first into an upper rain garden and then flows under a pedestrian bridge into a lower rain garden surrounded by decorative boulders. New park amenities at this site include a flexible permeable pavement plaza and walkway, seatwalls, open lawn space, and a variety of attractive plantings and trees.

Speaker Bio

Stephen has 5 years of engineering experiencing working on a variety of civil engineering projects. Stephen's work at Jacobs primarily includes the design and permitting of stormwater management facilities. The design work has been for both public and private clients with both new construction and

retrofits. Stephen also has been involved in various small site development projects, County MS4 reporting, and climate resilience studies.

Thursday, September 2nd, 9:00 AM
Mark Grabowski, ITpipes
How Smaller Communities Can Do More With Less

Abstract

Many agencies today - especially in the Mid-Atlantic region - are faced with the same issue - having to find ways to "do more with less". Shifting workforces, increasing environmental restrictions, and an often-decreasing rate payer base are burdens many agencies must bear. For the smaller communities, that weight is exponentially heavier. However, some smaller communities have taken cost-effective steps that have increased workflow efficiency and have been a saving lifeline to helping them maintain their wastewater collection system. These agencies, in spite of their small size, have found success in implementing integration and workflow of their pipeline inspection and asset management softwares With proper asset management, often starting with standardized condition assessment, a small community can often spend their time, resources, and funds more effectively on infrastructure improvement. There is never a one-size-fits-all when it comes to implementing asset management and condition assessment. Some of the basics that will be covered in the presentation include: Initial inventory. How to develop an authoritative inventory using location awareness mapping software as the basis of a condition assessment program. Getting agencies to an area where they have a fairly-accurate inventory of their underground assets is an absolutely critical part of the foundation. Selecting an inspection software or inspection template and covering the basics of pipeline planning and prioritization based on condition assessment. Templates could include NASSCO's PACP, SPICAP, CH2M Hill's SCREAM, or their own standard. Focus on the criticality of having a standardized assessment SOP and its importance to the overall process and life cycle of the asset. Explain various experts' opinions on reviewing run-to-fail efforts versus risk-based management, as well as and the pros and cons of each. The goal of the presentation is to make small system directors and/or the consulting engineers that service them aware of the affordable tools and practices available to help implement better asset management practices. With simple steps and tools, small agencies can stop performing reactive work - which is expensive, time consuming, often damaging to the environment, and inconvenient for residents - and start performing proactive work.

Speaker Bio

Mark Grabowski is an18-year veteran of the industry, specializing in the inspection and rehabilitation of collection and distribution systems. Mark's career has included work ranging from sewer & water installation, to engineering of multiple inspection devices and techniques, to sales & business development of software and equipment. His achievements include multiple patents and as well as co-authoring various industry specs and manuals. Mark holds a BS in Mechanical Engineering from UCF

Thursday, September 2nd, 9:30 AM
Kevin Flis, Xylem
Using Smart Infrastructure for Stormwater Capture

Abstract
Learning Objective The audience will learn how smart sewer networks reduce overflows, optimize hydraulics, minimize the cost of capital required to make these enhancements, and improve system maintenance by using a real time – decision support system (RT-DSS). This will be supplemented by using case studies to demonstrate how these tools are deployed, utilized, and received by utilities. Background In the face of a slowing economy and dwindling revenues, water and wastewater utilities are face with the two-faceted challenge of having to maintain aging infrastructure without having the available capital to make infrastructure upgrades. Fortunately, with advancements in smart technology we are able to unlock the true capability and capacity of our network of assets. This allows the utility avoid substantial capital investments to achieve their combined sewer and sanitary sewer objectives, to be more impactful with their resource deployment, extend the life of their assets, and reduce their operating expenses. Methodology By collecting a stream of real-time data from the field including sensors placed in the collections system, Supervisory Control and Data Acquisition (SCADA) systems, and a real time weather precipitation data and forecasts, the RT-DSS provides a detail of the following: Operational guidance on what actions to take to achieve the objectives of minimizing overflows and identifying where there is excess capacity and how best to use it. Maximize the hydraulic capacity of the entire network to ultimately reduce the cost of capital for any unnecessary equipment upgrades. Active, automated and continuous monitoring of the sensor network. Real-time collections system condition assessment including identification of any hydraulic anomalies (i.e. blockages or sediment). Finding This presentation will discuss the development and implementation of RT-DSS for utilities across the country including two utilities within the Chesapeake watershed: HRSD and Richmond, VA. These cases will demonstrate the many benefits and describe how other utilities may consider moving forward with an intelligent watershed management program. Status Deploying RT-DSS for collections systems have saved utilities as much as $500M in avoided capital costs by optimizing the hydraulics of the existing network, reduced overflow volumes by as much as 70%, and save as much as $1.5M annually in maintenance and operation costs. These ongoing deployments are continuing to save utilities vast amount of time and money and provides their staff the information needed to make the most prudent decisions in real-time.

Speaker Bio
With over 13 years of experience in water and wastewater, Kevin Flis has been an integral part of many of the different facets required in planning, developing, and implementing digital solutions. Kevin now focuses his attention on advancing collaboration and resiliency through a One Water approach.

Thursday, September 2nd, 9:30 AM
Teresa DiGenova, Black & Veatch
Noman M. Cole Pollution Control Plant Greenhouse Gas Reduction: We Do Our Part

Abstract

Recognizing the impact of greenhouse gas (GHG) emissions on global temperatures and climate, Fairfax County is participating in GHG tracking and reduction in support of the 2015 Paris Agreement to reduce GHG emissions. Even before the County-wide initiation of GHG tracking, staff at the County's Noman M. Cole, Jr. Pollution Control Plant (NMCPCP) had developed a plant-focused GHG Inventory which included Scope 1, 2, and 3 sources of GHGs from the plant and its processes. As they continue to provide the County with safe, reliable, and cost-effective wastewater treatment, Fairfax County has changed and improved processes at the NMCPCP. The County recently reviewed and updated its NMCPCP GHG Inventory to reflect the process changes at the plant that had been implemented since the original development of the Inventory. The updated Inventory also captured changes to GHG tracking methodology and emissions factors that had been introduced since the original development of the Inventory. This presentation will discuss how Fairfax County proactively developed a user-friendly GHG Inventory for the NMCPCP to allow straightforward annual emissions evaluations. It will discuss how the GHG Inventory informs the MNCPCP's in-progress energy audit and future decisions. It will highlight the importance of selecting the correct Key Performance Indicators (KPIs) to allow accurate evaluation of GHG emission trends and illustrate the GHG reduction captured by the model while gauging the impacts of updated methodology, revised emissions factors, and plant process changes. Finally, the presentation will demonstrate how a proactive utility can define and tackle a "slice" of emissions, use their information to improve future planning and decision-making, and contribute to lower GHG emissions and a healthier future for the County and worldwide.

Speaker Bio

Ms. DiGenova received her B.S. from MIT in chemical engineering and her M.S. from Georgia Tech in environmental engineering. Her experience with Black & Veatch includes projects related to utility energy management, wastewater collection, and potable water distribution. She is Past Chair of the Chesapeake Section of the AWWA and has presented at various regional and national conferences. In 2014 she received CSAWWA's Carl J. Lauter Award for outstanding service to the section.

Thursday, September 2nd, 9:30 AM
nick lewis, gannett fleming
Designed. Bid. Built: Considerations from the Contractor and Consultant on the Clinton Zone Transmission Main

Abstract
Established in 1918, WSSC Water is currently among the largest water and wastewater utilities in the nation, with a network of nearly 5,768 miles of potable water pipeline and over 5,578 miles of sewer pipeline. With a service area spanning nearly 1,000 square miles in Prince George's and Montgomery counties, WSSC serves 1.8 million residents through approximately 475,000 customer accounts. Part of this network of water distribution pipelines is the Clinton Zone Transmission Main, 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 this critical infrastructure – the central three-mile segment – was designed in 2016 and faced the 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. During the design of this high-profile project, the owner and engineer collaborated to provide a design package that was not only constructible, but also supported by stakeholders and the local community. Engineering challenges were overcome with creative solutions, like custom multipurpose vaults to consolidate valving and access. For permitting, environmental agencies and the State Highway Administration were engaged and met with early and often to ease the permitting process and reduce potential design delays. WSSC also hosted public meetings at the local public library to inform residents and commuters of the adjacent Maryland Route 5 on what to expect during construction and to discuss any concerns. The project's success can be tied to the cooperative manner in which the 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 this critical transmission main for WSSC's system 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.

Speaker Bio
Nick Lewis is project engineer in the water/wastewater group of Gannett Fleming's Baltimore office. For the past 9 years Nick has provided design assistance for a wide variety of projects, including pump stations, water and wastewater treatment facilities, storage tanks, and transmission, distribution, and

collection utilities. Nick is a registered professional engineer in the state of Maryland and currently serves as a trustee for the Chesapeake Section of AWWA.

Thursday, September 2nd, 9:30 AM
Ashton Rogers, GHD, Inc
Construction of Stormwater Management Facilities to meet permit requirements – Not as easy as it sounds!

Abstract
Stormwater management laws and regulations require and encourage localities to develop and implement stormwater treatment measures to mitigate the effects of continued growth and development. The required minimum action items are described within the permit language of each Municipal Separate Storm Sewer (MS4) permittee. These regulations mandate the municipalities to develop the necessary programs to facilitate the design, construction, recordation and maintenance of stormwater management infrastructure. As stormwater management programs for the large MS4 Phase I municipalities, like Anne Arundel County, get off the ground and enter into the construction phase, various construction challenges arise and need to be considered within the program overall planning. This presentation will review the challenges associated with the construction and implementation of stormwater water management BMPs. In particular, we will look at three construction projects in Anne Arundel County. Project A is the retrofit of an existing dry BMP into an extended wetland. The specific challenges associated with the construction of Project A include a groundwater table more than a foot higher than the adjusted seasonal high, compaction and installation of the impermeable clay core and clay liner. Project B is the restoration of a stream and fish passage. The construction challenges for Project B include accessibility to the construction area within the stream limits due unsuitable soils and the installation of boulders on soils that offer no structural support. The existing soil characteristics of the site are crucial in construction planning. In the case of Project B, the contractor lost a piece of equipment due to it sinking into soft silty soil and ultimately being damaged beyond repair. In addition, the construction of the proposed stone weir structures required a considerable amount of additional materials to make up for material being absorbed into the soft soils. Project C is the retrofit of a dry basin into an infiltration basin. Construction challenges associated with Project C include high groundwater and implementation of structural erosion control matting on the basin overflow. Due to the high groundwater, the proposed dry sediment forebay ended up being a wet forebay that was deeper than 18 inches and therefore would require a safety fence or the depth of the forebay to be lowered to less than 18 inches. The presentation will go into the details of each project, its significant construction challenges and resulting consequences. We will look into the effects of the unusually high rainfall the region has received, how unaccounted for site conditions can influence construction progress and we will consider the associated cost ramifications. Stormwater management is an expense municipalities have to manage and budget for. Knowing more about the construction practices and risks can better prepare you to budget and plan for your stormwater projects.

Speaker Bio
Name: Ashton Rogers Education: Bachelor of Science in Civil Engineer with a minor in Mechanical Engineering University: Old Dominion University, Norfolk, VA Graduation Date: December 2006 Ashton started out his career as an intern which translated into a full-time job in Land Development and site/civil design. He has worked extensively on multi-discipline projects with his primary role being the site/civil engineer. Currently Ashton is the "Engineering Design Discipline Lead" for GHDs SE Region.

Thursday, September 2nd, 9:30 AM
Nicole Clarke, Tank Industry Consultants
Infrastructure Asset Management

Abstract

With today's emphasis on infrastructure management, the need for a method to rate and prioritize water storage tank maintenance requirements has become increasingly evident. To aid in managing these critical components of a water system, a computerized management tool for comparing the relative overall condition of tanks within the same water system simplifies long-term maintenance prioritization, forecasting the estimated cost and optimal scheduling of tank maintenance. This presentation will guide all water professionals through a proven approach to managing their tank assets. Owner-Performed Proactive Maintenance: Geared to Owner's personnel who are charged with the day-to-day monitoring and maintenance of the water storage tanks, this portion of the presentation will discuss what to look for, how to monitor the condition and pinpoint warning signs of the need for more extensive evaluation. Professional Pre-Maintenance Inspection: It's no secret that investor-owned and municipal utilities are having to cut costs across the board. This portion of the presentation will demonstrate why a pre-maintenance inspection is vital to a successful tank rehabilitation project and will acquaint attendees with various methods of evaluating tanks, frequency for tank inspections, and key components of a professional tank inspection. Maintenance Management Prioritization System for Water Storage Tanks: This segment of the presentation will introduce attendees to a computerized maintenance prioritization system that ranks based on various criteria and assists Tank Owners with proactive management of tanks within their system. The system allows the Owner to base maintenance schedules on multiple considerations. Reactions of Tank Owners who have utilized this system for many years will be presented. Their insight into the system's value to their asset management program will be offered. Tank Rehabilitation: Thorough detailed project specifications and bid documents are essential to any tank rehabilitation project. Specifications that just address the tank coatings, environmental concerns, or needed repairs will result in a poorly executed project. Properly developed specifications represent a holistic approach to the rehabilitation project and when designed by an engineer familiar with water storage tanks result in a quality, smooth-running project. The quality of the painting contractor's workmanship is by far the biggest factor affecting the quality of the application and the coatings' adhesion to the substrate. Yet, the tendency among most storage tank owners is to think of tank painting as they would painting their dining room or living room…hire the lowest priced contractor and trust they will do a good job. They minimize the cost of inspection, trust the contractor to be fair and do a good job, then hope for the best. This section of the presentation will discuss the important aspects of tank rehabilitation specifications and inspection techniques and expertise required to achieve a long-lasting tank rehabilitation project. Future of Tank Asset Management…Where do we go from here? To round out the presentation, the presenter will offer his insight into what new developments in regulatory requirements, standards, and technology will likely shape future tank maintenance, propelling Tank Owners into future Asset Management.

Speaker Bio

As Business Development Manager of Tank Industry Consultants' Eastern Region, Nicole Clarke serves as client liaison on the development and execution of tank rehabilitation and new tank construction

projects throughout the eastern portion of the United States. She has been involved in the structural coatings industry for more than 18 years.

Thursday, September 2nd, 11:00 AM
Seth Finnicum, Arcadis
When Best-Laid Plans Go Awry: Adapting BEM Deployment to Meet Specific Project Challenges

Abstract

Arcadis has helped clients throughout the United States assess the condition of their assets and plan for pipeline replacement by systematically analyzing and identifying high risk pipelines prior to failure and taking the most cost-effective action for renewal or replacement. As part of system-wide risk assessments, Arcadis deploys a comprehensive array of non-destructive testing (NDT) techniques to identify pipe deterioration patterns and specific pipe conditions through evaluation of sites identified as the highest risk following a desktop analysis. Following its tiered approach, Arcadis first performs screening investigations utilizing, for example, leak and gas pocket detection. Then, potential locations of concern identified by these screening investigations are tested using detailed inspection tools such as Broadband Electro-Magnetic Testing (BEM). BEM is a non-destructive test utilized to evaluate the thickness of and detect flaws in ferrous infrastructure. This versatile test can detect flaws on both inner and outer surfaces as well as inclusions, graphitization and fractures of ferrous infrastructure under inspection through the placement and moving of sensor antenna to scan the complete surface area of the pipe. BEM is typically deployed to map the full surface of pipes, internally or externally, through delivery tools such as the Hand Scanning Kit (HSK) or various remote and semi-remote sensor placement tools. It offers multiple distinct advantages over traditional thickness NDT through ultrasonics, including the ability to test though linings and external encrustation without the need for removal.However, during multiple system-wide risk assessments undertaken by Arcadis, screening tests were not able to be performed due to access and technology limitations or failed tests, providing limited or no data to utilize in identifying potential problem spots. In each case, potential sites for detailed investigations were identified based upon failure history and pipe configuration, but without the winnowing down from the screening assessments, the number of potential sites was much greater than typical, requiring greater time and cost to implement. To help control cost and efficiency in performing inspections, Arcadis developed a small footprint, low-cost screening technique utilizing a prototype built with household supplies, and duct tape. Coordination with the BEM manufacturer Rock Solid turned this prototype into the new small, adaptable PAT tool to take “virtual coupons” of the pipe. These “virtual coupons” were then analyzed using the on-board BEM software to triage the pipes based upon variations across multiple locations or localized flaw detection pointing to area(s) of interest for more detailed investigations. This presentation will review traditional BEM deployment methods and compare them to situations we have encountered where none of the existing delivery tools were optimal due to site conditions such as congested utility corridors, pipes where screening tests were not able to be performed, and pipes where screening techniques failed. It will further elaborate upon the development of the new low-cost “virtual coupon” tool and testing techniques and how they were used to test locations where existing delivery tools were sub-optimal.

Speaker Bio

Mr. Finnicum is an experienced water and wastewater pipeline project manager, specializing in capital program development and management; condition and risk assessment; and data analytics and innovation. He has focused on large programs involving municipal water distribution and combined, sanitary and stormwater collection system planning, design and construction.

Thursday, September 2nd, 11:00 AM
Christopher Moline, HDR
Let's Start-Em Up! Efficiently Integrating Digester Start-up into Plant Operations

Abstract

Experience from two recent anaerobic digester startups in Maryland and Virginia will be presented, providing practical examples of process startup approaches and challenges. Anaerobic digesters at Howard County's Little Patuxent Water Reclamation Plant (LPWRP) have been in operation since January 2019, producing Class B biosolids. Hampton Roads Sanitation District's Atlantic Treatment Plant (ATP) previously operated anaerobic digesters to produce Class B biosolids, and started up a new thermal hydrolysis process (THP) in June 2020 to produce Class A digested biosolids. Startup of Class B digestion at LPWRP and conversion from Class A to Class B digestion at ATP will be compared, with consideration to safety, process stability, regulatory compliance, and maintenance of plant operations. Many examples and considerations will also apply to restarting digesters for regular maintenance. Digester seed was obtained from a similar Class A or Class B mesophilic anaerobic digester in the region. Seed quantity relative to overall primary digester volume was 5% at LPWRP, and will be 9% at ATP. The initial digester feed rate is based on the seed quantity and source digester loading. At LPWRP, subsequent increases in digester loading were made in discrete steps each week. A continuous ramp up approach will be used at ATP. Changes in the VFA-to-alkalinity ratio are monitored to verify process stability. Both plants have similar primary digester retention times (~21 days). However, the organic loading rate is over two times higher at ATP due to the 10% solids feed from THP. The allowable operating levels are also different for the LPWRP and ATP digesters, which impacted the approach for purging oxygen from the tanks and subsequent startup. The LPWRP digesters started at low liquid level due to the use of fixed covers and pumped mixing. In contrast, the ATP digesters were started full due to the floating covers and draft tube mixing. While the digesters at LPWRP performed well throughout startup, issues with data collection were identified and addressed for more accurate reporting. Sampling locations for volatile solids reduction were adjusted to obtain well-mixed samples, and digester feed flow meters required periodic flushing to accurately calculate digester retention times. Class A certification at ATP requires pathogen density measurements, and cleaning of the digesters was required prior to seeding. Additional lessons learned from the Class A startup will be presented.

Speaker Bio

Chris graduated from University of Michigan with a Bachelors in chemical engineering and Masters in environmental engineering. He has been with HDR in the Mid-Atlantic region for the past 8 years. His project work has focused on biosolids management and nutrient removal, from project planning through process startup.

Thursday, September 2nd, 11:00 AM
Joseph Jacangelo, Stantec and the Johns Hopkins University
Treatment of PFAS in Well Water: Assessment of Removal by Granular Activated Carbon and Ion Exchange

Abstract
The presence of PFAS (per- and polyfluoroalkyl substances) in groundwater and surface waters continues to be a salient and important water quality issue for many utilities around the country. PFAS guidance levels, health-based and regulatory values pose an increasing challenge for groundwater supplies impacted by contamination from manufacturers producing these compounds. Many utilities have installed permanent or interim granular activated carbon (GAC) facilities as an mitigative measure. However, other PFAS treatment options are still developing. As such, utilities have been interested in evaluating ion exchange (IX) as another potential treatment alternative for PFAS. To this end, a pilot study, which is being conducted by Stantec in conjunction with the Johns Hopkins University Bloomberg School of Public Health, is directly comparing IX and GAC from both operational and water quality perspectives on a low turbidity, low total organic carbon well water. A specially designed, five-column PFAS removal pilot plant with interim column sampling ports was constructed for the pilot study. Thirty-two different PFAS, including short-chained ones such perfluoropropanoic acid (PFPrA), are being evaluated. Of the 32 compounds measured, 13 were detected in the target water being treated. The two in highest concentrations were perfluorobutanoic acid (PFBA) and PFPrA at approximately 900 ng/L and 400 ng/L, respectively. The five treatments of the raw well water that are being directly compared are: (1) two different IX resins; (2) a GAC carbon; and (3) a mixed treatment of GAC followed by the two different IX resins (in separate filter columns). The compound of that broke through both IX resins most readily was PFBA, in part due to its high concentration in the feed water. However only very low concentrations of this compound were found in the GAC effluent (1.2 ng/L) or the IX resins with GAC pretreatment (0.6 – 0.7 ng/L). The only other PFAS detected at any appreciable level in the effluent of any of the treatments was PFPrA (100 to 372 ng/L, depending on the treatment employed). The initial data suggest that for the particular resins being evaluated, IX without GAC pretreatment performed less efficaciously than IX with GAC pretreatment. However, it should be noted that all treatments are currently meeting the health index goals set by the regulatory agency for this particular utility. Long-term removal data will be presented from the study, which will ultimately be useful for those utilities interested in employing IX for PFAS treatment.

Speaker Bio
Dr. Jacangelo is a Vice President and Director of Research for Stantec and an adjunct faculty member of the Johns Hopkins University. He is a past AWWA Board Member, a past Chair of both the Technical and Education Council and International Council. He has served as either chair or member of 26 of AWWA's various committees. Dr. Jacangelo is a past recipient of the AWWA Golden Spigot Award and two AWWA Best Paper Awards. He also received that organization’s Volunteer of the Year of Award.

Thursday, September 2nd, 11:00 AM
Ben Wright, Hazen and Sawyer
Development of a Climate Action Plan to Improve Resilience of Municipal Infrastructure

Abstract

The threat of impacts from climatic events to municipal infrastructure in Maryland is a growing concern both in coastal and inland areas. Recognizing these risks, Baltimore County tasked Hazen and Sawyer with developing a Climate Action Plan focused on a county-wide climate change vulnerability assessment, prioritization of vulnerabilities, and development of adaptation strategies for County-owned infrastructure. The project goal is to create an adaptation plan and prioritized CIP to build the capacity of the County to include climate change data in decision making. Hazen is applying a risk assessment methodology to identify vulnerable county assets across a broad spectrum of services (public works, fire/rescue, police, utilities, transportation, etc.) based on current and projected extreme events and identifying adaptation options that can be incorporated into the County's CIP budget. Hazen utilized efficient GIS tools to screen County assets within existing FEMA flood zones, vulnerable to coastal flooding under future sea level rise, and assets vulnerable to future increases in extreme storms and inland flooding. The transportation analysis evaluated areas at risk of increased emergency response times due to roadway flooding to prioritize roads for adaptation. Hazen developed a catalog of adaptation asset-level strategies with cost estimates in order to evaluate the cost-benefits of each option. The climate assessment results were loaded into a dashboard that can be used to easily convey vulnerable assets to stakeholders. This presentation will review the tools and methods used to identify climate change risks and screen a large volume of assets across the County. This presentation will be designed to be useful for utilities managing any assets (water, wastewater, storm, etc.) that could be negatively impacted by climate change.

Speaker Bio

Ben Wright received his BS from Virginia Tech and his MS from Johns Hopkins University. Mr. Wright is an Associate at Hazen and has performed planning and analysis for water resources management, resiliency, risk assessments and source water protection projects for municipalities across the US.

Thursday, September 2nd, 11:00 AM
Laura Khouvilay, CArollo Engineers
Development and Implementation of a Sustainable Condition Assessment Program for Water Distribution and Transmission Mains

Abstract
WSSC Water's system consists of over 5,700 miles of transmission and distribution water mains, approximately 90 percent of which are metallic. WSSC Water bases renewal decisions for their metallic water mains on desktop analyses of break and leak history, pipe material, pipe age, risk, and available condition assessment data. WSSC Water is committed to advance its metallic water main condition assessment program (Program) by identifying cost-effective, validated, and innovative condition assessment tools that increase confidence in pipeline replacement decisions. We will present a review of WSSC Water's current and prior water main prioritization processes and present an updated prioritization approach developed in collaboration with WSSC Water staff. The updated approach is tailored to selecting and prioritizing metallic water mains for condition assessment. The approach for selecting and scheduling water mains for condition assessment is designed to integrate with WSSC Water's water main risk-based prioritization process as part of the annual Asset Management Program (AMP) reporting to support an assess-and-fix methodology. The updated approach supports the following objectives: • Distinguish point failures from distributed failures (i.e. repair vs. replace vs. rehabilitate). • Provide early warning of failure potential for water mains with high consequence of failure. • Justify replacement decisions. • Improve confidence of replacement needs forecast. • Optimize remaining useful life. • Calibrate existing WSSC Water condition model results. The condition assessment prioritization approach results provided WSSC Water with an initial set of metallic water main candidates for assessment. Using this approach, we identified over 220 miles of distribution and transmission mains for condition assessment. From this, a short-list of water transmission (≥16-inch diameter) main alignments and water distribution mains (< 16-inch diameter) were paired with specific condition assessment technologies for the first year of the program. The inspection technology selected for each alignment considered accessibility, the resolution (level of detail) to be expected in assessment results, and cost. The remaining water mains not inspected each year are then re-prioritized along with the full network of water main assets to determine the priority inspection candidates for the next year.

Speaker Bio
Laura Khouvilay is an Associate Vice President with Carollo Engineers with nearly 15 years of experience in the water and wastewater industry. She is a leading expert on hydraulic modeling and has extensive experience in water and sewer system planning and optimization, condition assessment, and asset management. Ms. Khouvilay currently serves as the Program Manager for Condition Assessment Program for metallic water mains for WSSC Water . She is a licensed PE in Virginia, Maryland, and DC.

Thursday, September 2nd, 11:30 AM
Christopher Wilson, Brown and Caldwell
Comprehensive Force Main Inspection Using Non-Destructive Testing

Abstract

WSSC Water, a water and wastewater utility servicing Prince George's and Montgomery Counties in Maryland, has developed a program to perform condition assessment of its force mains. The pipeline inspection and condition assessment team selected the 14-inch diameter Forest Heights Force Main (Forest Heights FM) which is approximately 1,800 linear feet and located in Prince George's County. The assessment completed includes wall integrity testing that was performed in July 2020 with numerous sections of significant wall loss identified. Lessons learned and the value of the testing will be conveyed in the presentation. The Forest Heights FM conveys untreated wastewater from the Forest Heights Wastewater Pump Station and travels northeast behind private homes to a gravity sewer interceptor. Per the record drawings, the cast iron force main was installed in 1946. A prioritization report completed by WSSC Water, entitled "Wastewater Force Main Inspection Prioritization Report," (February 2016) ranked the Forest Heights FM near the top of the list for inspections. The force main experienced two failures since June 2015 and is at risk of future structural failures. In 2016, Brown and Caldwell (BC) was contracted to prepare an Emergency Response Plan (ERP) and prepare a plan to inspect the Forest Heights FM. BC selected several companies and contractors who have the technology and capabilities to inspect the pipeline including a soil testing company, a general contractor, and a pipeline inspection firm. The pipeline inspection firm was tasked with the inspection and evaluation of the metallic properties and thickness of the force main pipeline walls. A variety of technologies were considered including Magnetic Flux Leakage (MFL) and Remote Field Testing (RFT). The See Snake© tool from PICA was selected which requires no contact with the pipe wall, and can measure through scale, wax, and non-magnetic liners. It uses a non-destructive testing (NDT) method of inspection and equally sensitive to internal and external flaws. The tools are designed to find localized areas of wall loss and measure the depth and length of local wall loss indications. Unlike leak detection or average wall assessments, the RFT provides actionable information that can be used to drive repair, rehabilitation, and replacement schedules. A Work Plan was completed detailing the process for creating an access point (adding a wye at the upstream end of the force main), bypassing the Forest Heights PS for the inspection operation, cleaning the pipeline with foam pigs, using a gauge pig to confirm pipe diameter, and finally pulling the inspection tool through the line. The work was successfully completed in July 2020. The inspection report shows detailed information about wall thickness/deterioration along the entire route with more than 1,700 pitting locations identified of varying wall loss percentages. Recommendations for repair/replacement are based on the factor of safety analysis performed using these wall thickness results. WSSC Water has demonstrated the functionality and benefit of using a non-destructive testing method which gives detailed evaluation along an entire force main alignment. This leads to informed decision making for continued maintenance of service for its customers.

Speaker Bio

Mr. Wilson is a Senior Manager with Brown and Caldwell with more than 25 years in the water and wastewater industry. He is a graduate of Duke University and is a licensed Professional Engineer in Virginia, North Carolina, and Florida. He is the former chair of the VWEA Collection Systems Committee.

Thursday, September 2nd, 11:30 AM
Tiff Bradshaw, Maryland Environmental Service
HAIR TODAY, GONE TOMORROW!

Abstract

The Maryland Environmental Service (MES) operates several wastewater treatment plants throughout the State of Maryland that recently were upgraded to Membrane Bio-Reactor (MBR) to be able to comply with site specific stringent nutrient discharge limits. Upgraded Wastewater Treatment Plants include flat plate microfiltration membranes (MF) (0.4 µm), flat sheet ultrafiltration membranes (UF) (0.04 – 0.09µm), and tubular membranes with 0.03 µm pore size. Despite the superior effluent quality and smaller footprint of the MBR systems, they require a very intensive operation and maintenance schedule that is more expensive compared to conventional treatment technologies. The purpose of this paper is to provide a comprehensive understanding of key factors impacting MBR operation, possible reasons for frequent cleaning, membrane fouling and fouling control techniques. Membranes lose their ability to easily permeate with throughput. It is natural for membranes to get fouled gradually as throughput increases. As the membrane becomes fouled it requires chemical cleaning to remove organic/inorganic fouling on the membrane surface. Membrane fouling and frequent cleaning reduces plant productivity and increases maintenance and operating costs. Membrane fouling is influenced by biomass characteristics, operating conditions, and membrane characteristics. The system performance at multiple MBR plants was continuously monitored for an extended period to have a better understanding of filtration characteristics and effluent quality in each system. The performance of MF and UF MBR systems has been analyzed for different parameters such as flux rates, permeability, TMP, operating modes, operating MLSS concentrations, filterability, coarse suspended solids (CSS), CIP cleaning frequency, and chemical costs. Screening is critical for MBRs to protect them against mechanical damage from sharp or abrasive particles and to prevent clogging or fouling from hair, microfibers and other fibrous materials also known as CSS. These materials often pass through the fine screen equipment and aggregate in the reactor basins due to the constant mixing action, possibly causing sludge accumulation in between membrane plates/sheets and in the diffuser casing. This is also known as bearding or ragging. MES developed and installed an additional low cost and unique screen made with inexpensive materials to capture the fibrous materials and hair that often passes through the fine screen and ends up in the mixed liquor. A significant amount of material has been captured in a short period of time reflecting how much hair and fibrous materials can pass through a 2 mm fine screen. This simple and cost-effective fix has reduced the cleaning frequency and bearding at several of our MBR facilities.

Speaker Bio

Tiff Bradshaw is a Deputy Division Chief with Maryland Environmental Service (MES). He has over 30 years of field experience in operations and maintenance (13 years with Anne Arundel County Bureau of Utilities, 3 years with Howard County DPW and 15 years with MES). He manages operations for 270 water and wastewater facilities across Maryland. He has 5 years of experience with Ovivo, Kubota and Smith & Loveless Membrane Bio-Reactors.

Thursday, September 2nd, 11:30 AM
Antony Gibson, Ramboll
Suspended Ion Exchange Pre-treatment for Dissolved Organic Carbon Removal

Abstract

Many drinking water source waters are seeing increased concentrations of dissolved organic carbon (DOC) due to local, regional and global environmental changes. For drinking water plants, this is causing challenges meeting final water quality goals, as well as bottlenecks with existing treatment processes. Ion exchange has been used as a pre-treatment to remove DOC at the front-end of drinking water plants. Using ion exchange as a pre-treatment can provide substantial downstream process benefits. Most significant is reduced coagulant consumption, which reduces chemical costs, lowers sludge production and can unlock additional plant capacity. Removing additional DOC (especially lower-molecular-weight fractions that are difficult to remove with coagulation) can also provide important benefits to filtration, ozonation, GAC and other processes. This presentation will discuss the introduction of a novel suspended ion exchange process into the US market. The technology was developed in the Netherlands by PWN, a Dutch drinking water utility. It was developed to address perceived disadvantages of other commercially available technologies. Most notably, the process uses longer contact times and regenerates 100% of the resin on every pass. This enables the use of a wide range of commercially available ion exchange resins, reducing cost and improving security of resin supply. This presentation will cover three topics. Firstly, an overview of the technology: its development, process design and typical operating parameters. Secondly, a case study based on the Mayflower Water Treatment Works in England. This is a 24 MGD drinking water facility, treating surface water from river and reservoir sources. This plant commenced supply in the summer of 2020. And finally, the preliminary results of the first trials in the United States. In January 2020, Ramboll conducted jar trials for a large drinking water plant in Florida. This showed that application of ion exchange could reduce coagulant demand by 80%, whilst enabling the utility to get final water DOC below 2 mg/L. In November 2020, Ramboll commissioned a 30 gpm pilot plant, which is operating to validate performance, and impact on downstream processes (coagulation, sedimentation, ozonation and biofiltration). The presentation will outline the trial results, and implications for full scale design.

Speaker Bio

Antony Gibson is a drinking water technology specialist with more than 20 years experience. Before joining Ramboll in January 2020, he served as Chief Operating Officer with PWNT, where he successfully delivered several large drinking water plants, including the worlds' largest ceramic microfiltration plant in Singapore, and the Mayflower project in the United Kingdom. In previous roles, Antony was responsible for manufacturing, marketing and R&D of the MIEX® ion exchange business.

Thursday, September 2nd, 11:30 AM
Jessica Seipp, Dewberry Engineers
Pluvial Flooding Vulnerability Assessment and Planned Mitigation in Clover Hill, Frederick County, MD

Abstract

Recent flooding events and resident concerns resulted in Frederick County's Office of Sustainability & Environmental Resources (OSER) and the Division of Public Works (DPW) pursuing a drainage and capacity study of the Clover Hill neighborhood. Dewberry performed this study to analyze watershed characteristics, identify causes of flooding, evaluate recent flood events, and identify opportunities to increase the capacity of the existing stormwater conveyance systems to help alleviate flooding. An analytic framework was developed as a process to streamline and prioritize goals. The framework embodied key objectives and questions, data needs, and metrics for tracking success. Detailed field assessments were performed to evaluate existing stream, watershed hydrologic and hydraulic conditions within the study area. Historical flooding data was collected from residents through a detailed landowner questionnaire, which served as an effective public involvement tool to generate calibration and validation data. A PCSWMM 2019 Professional 2D model was developed for the study area covering 630 acres, including ~ 6,200 linear feet of stream, ~ 22% impervious area, and composed of predominantly low and medium density residential development. The watershed model included a hydrologic runoff component, a 1D component for the urban stormwater infrastructure (ditches, storm drains, culverts, SWM facilities, etc.) and a 2D component to simulate overland flow and establish flood extents and depths. A rain-on-grid approach was utilized to determine stream and pluvial flooding impacts. The model was calibrated and validated using the land owner flooding survey data, regional regression equations for watershed hydrology, data from actual flood events in May 2018, July 2018, and May 2019, and effective FEMA flood risk data (2017). Results of the calibrated model showed that the extent of flooding increases as the storms become less probable and more intense. The 2D urban stormwater model is capable of accurately predicting stream based (fluvial) and rainfall runoff based (pluvial) flood vulnerability in the Clover Hill neighborhood. Flooded area (extents) and average flood depths approximately double from the 2 year, 24-hour event to the 10 year, 24-hour event, and from the 10 year, 24-hour event to the 100 year, 24-hour rainfall event. The key issue in Clover Hill is the inadequate capacity of roadside ditches and culverts combined with ground saturation resulting from multiple events of varying intensity and duration within a short period of time. This presentation will share our innovative approach to identifying flood prone areas and mitigation strategies and developing concept plans which address both water quantity and quality. We will share findings from the study which form a reliable basis for identifying, designing and implementing restoration measures within the stream, corridor, floodplain and upland regions within the study area and how flooding hot spots identified by the model can help focus and prioritize restoration activities to improve overall community resilience for current and future conditions.

Speaker Bio

Jessica Seipp is a Water Resources Department Manager with Dewberry. She has 19 years of water resources experience related to meeting NPDES Phase I/II permit and the Chesapeake Bay TMDL requirements. She has a B.S. from Oregon State University in Biology and Environmental Science. Outside of work, she enjoys scuba diving, traveling to New Orleans to visit her family, and spending time with her husband and 6-year old daughter.

Thursday, September 2nd, 11:30 AM
Sonia Oton, Mott MacDonald
The Day After Pipe Inspection…What Do I Do With the Data!!

Abstract

Have you ever been in a situation where several assets need to be fixed but there is only budget to do so much? The needs may be many while the budget could be restricted. Asset Management allows the utilities to systematically manage their infrastructure and assets during their life cycles to deliver an agreed standard of service. An authority may have a robust Pipeline Condition Assessment (PCA) Program developed under their Asset Management framework, and systematically inspect large diameter water mains, determine remaining service life of the asset, renewal needs, and probability of pipe failure. But how all these can be integrated so the assets can be managed, and needs prioritized at the system level. More importantly, how do we take available budget into account to also manage the capital improvement program? There are different ways of doing this and different tools can help you reach your goal… Innovyze's InfoAsset Planner is one of them. InfoAsset Planner is an asset management risk prioritization tool, that ranks and prioritizes the utility's linear assets. In the process of customizing this tool to one's needs, a scoring system needs to be developed to rank and prioritize the renewal of large diameter water mains based on Pipeline Condition Assessment results. And although this may sound as a "piece of cake" type of task, prioritizing pipelines with different diameter, material, location and defects is not. A customized scoring system allows the authority to place each pipeline in a "cart" based on the PCA results, such as, leakage, pipe wall loss, remaining useful life, and electromagnetic results in general. The carts have a timeframe associated to them facilitating the prioritization of the pipelines. Cart 1 includes the mains in "Very Good" condition while cart 10 houses the mains in "Very Poor" condition. A cart 11 may also be defined for those pipelines that need immediate attention. In short, the secret of a well-run pipeline renewal program lies on the understanding of the PCA results and management of the pipeline defects. This presentation will include: (1) A brief description of the InfoAsset Planner tool and its implementation on a municipal authority, (2) A unique approach to rank and prioritize large diameter water main renewal needs based on pipe material and PCA results, (3) Criteria to develop the ranking "carts", (4) Examples on how the scoring criteria can help prioritize capital improvement jobs.

Speaker Bio

Ms. Oton is a Principal Project Manager at Mott MacDonald. Since 2014, Ms. Oton leads the DC Water's water program management linear assets team. Her responsibilities include assist executing the pipeline condition assessment program, provide pipe rehabilitation alternatives, and annually select 12 miles of distribution mains for replacement. She also assists WSSC Water develop and implement their condition assessment of buried metallic water mains.

Thursday, September 2nd, 12:00 PM
Robert Domkowski, Xylem, Inc.
"COVID-19 Modern Trash Loading Proves Sewage Pump Clog Resistance Can Not Be Predicted By Impeller Throughlet Size"

Abstract

The number one requirement of a solids-handling wastewater pump is its ability to pump unscreened sewage without clogging. The ever-increasing collection system loading rate exacerbated by the effects of COVID-19 further exposes the traditional multi-channel solids-handling impeller as unable to operate without partial to full clogging with soft solids. A wastewater pump's impeller throughlet size has been frequently used to specify clog resistance, despite data that demonstrates the irrelevance of this measurement, especially when considering handling modern wastewater containing non-dispersibles and FOG. Several published guidelines recommend a minimum impeller throughlet size based upon decades-past ideas. Pump clogging is a critical and highly undesirable operational problem in wastewater pumping, which results in increased operational and maintenance costs (OpEx) necessitating emergency calls from the end user utility. Clogging drastically reduces pump efficiency, causing increased energy consumption while pump unit mechanical damage to the bearings, seal and shaft unit can result. This paper will review the historical impeller design perspective as well as discuss the successful modern-day design concepts. The presenter will also establish how a pump's throughlet size has been shown to be a very misleading parameter in specifying solids-handling pump unit clog-resistance. The attributes of various traditional solids-handling impeller type will be reviewed. Finally, attendees will be provided with guidance regarding the importance of a modern solids-handling pump's wet-end design for achieving successful clog-free pump operation while enjoying sustained high hydraulic efficiency and low cost of operation.

Speaker Bio

Bob has 40 years of experience in pump application and PS design and is an Engineering Consultant at Xylem, Inc. He earned B.SME degree from Fairfield U. in CT. with post grad at U. of WI. He Chairs the WEF-MARC Committee, serves on WEF, NYWEA and NEWEA Collection Systems Committees, has presented technical papers at more than 50 environment conferences, was a pump expert at WEFTEC and MA Workshops and has received WEF and NEWEA Golden Manhole Awards and 5-S Shovels from NEWEA and NJWEA.

Thursday, September 2nd, 12:00 PM
Mike Cecil, American Contracting & Environmental Services, Inc.
Design-Build Innovations for the new Port Deposit WWTP

Abstract

The Port Deposit Wastewater Treatment Plant was constructed in the 1980's and sits adjacent to the Susquehanna River within the 100-year flood plain, making it prone to flooding. It is an aged plant over 40 years old and in dire need of repairs. The existing plant is rated for 150,000 gallons per day but is only processing about 34,000 gpd with outdated equipment and technology. In 2010 Cecil County agreed to take over the ownership and operation of the Port Deposit WWTP. Understanding the dire condition of the existing facility, replacement became a top priority. As experienced previously by the Town, the County found it challenging to balance existing and potential capacity needs while developing an affordable strategy for replacement. But facing a potential catastrophic failure of the existing tank structures, the County committed to replacing the facility even with no confirmed private contributions. Cecil County finally decided the best way to get the project moving was to put forth an RFQ/RFP for a lump-sum GMP design-build project. The County had previously acquired several acres of land north of the existing plant and out of the flood plain, for the new WWTP. However, the property was bounded to the north by a rock cliff, and to the south by the railroad, resulting in limited area to construct the new facility. The County's solicitation requested solutions to this complex problem which would meet immediate and future capacity needs, meet ENR discharge standards, and be feasible to construct on the acquired property. As a result of the competitive solicitation process, Cecil County selected the American Contracting & Environmental Services (ACE) and KCI Technologies design team to design and construct the new plant. The new treatment plant is a 3-train system (expandable to 4) and utilizes 4-stage Bardenpho Membrane Bioreactor (MBR) for the biological treatment process. The discharge limits of 3.0 mg/l TN and 0.3mg/l TP requires high level of nutrient removal capacity which narrowed the possible treatment process alternatives significantly, given the useable area of the new site. The ACE/KCI team will have designed, constructed and commissioned the entire plant in a period of approximately 18 months. In addition to the technical design challenges associated with treatment plant design and site restrictions, the County also required a very aggressive schedule for both design and construction phases. Meeting this schedule would have been challenging in a normal construction environment, and COVID19 concerns and precautions added yet another challenge. The design-build approach has greatly accelerated the speed at which the project is being completed. Detailed planning, continuous communication, 3D design technology, and manufacturer/supplier collaboration were keys to the success of the ACE/KCI team to date. Overall, the design-build approach has allowed the ACE/KCI team to work alongside the County and GHD as an integrated project delivery team focused on finally solving the wastewater challenge for the Town and surrounding area.

Speaker Bio

Mike Cecil is the Director of Business Development for ACE. His main focus is in collaborative delivery projects such as CMAR and Design-Build. Mike is very active with several committees and boards such as the DBIA Conference and Education Committees; WEF Awards Committee. Mike has been in the construction industry for over 39 years, working in the field or managing projects throughout the country and was Mechanical PM on a nearly three-year $250 million project in Port Said, Egypt.

Thursday, September 2nd, 12:00 PM
KRis Mapili, Stantec
Review of technologies to mitigate opportunistic pathogen occurrence in municipal drinking water

Abstract

Opportunistic pathogens (OPs), including Legionella spp., Mycobacterium spp., and Naegleria fowleri (also known as the "brain-eating amoeba"), are an important etiological source of waterborne disease in the United States and other developed countries. OPs are not generally derived from fecal matter; rather, they are more often found naturally in various aquatic environments including warm freshwater, cooling towers, and humidifiers, and are capable of survival and growth within the water distribution system itself. The exposure routes for OPs (e.g., inhalation of aerosols, aspiration of water into the lungs, eye contact, and skin contact) often differ from those for fecal pathogens (e.g. ingestion) and are of particular concern to individuals with compromised immune systems. OPs can persist throughout drinking water treatment operations, in the distribution system, and throughout premise plumbing in low-nutrient conditions. Their presence within the biofilms of pipes makes them particularly difficult to detect and control. While conventional disinfection practices are designed to target fecal pathogens (e.g. pathogenic E. coli, Giardia lamblia) in drinking water, some of these conventional treatment options may be ineffective in dealing with the occurrence and growth of OPs in municipal systems. The detection of Legionella spp. has been linked to low levels of chlorine residual in the distribution system; further, Mycobacterium spp. have been shown in the literature to be more resistant to chlorine, monochloramine, chlorine dioxide, and ozone than traditional bacteria. Thus, there is a need for development of alternative technologies to control OP occurrence in drinking water. This presentation will explore the effectiveness and limitations of current (e.g., chorine and chloramines) and emerging technologies, such as advanced oxidation processes, on mitigating the risk of OPs to persist in municipal water treatment systems. Each of the technologies will be described in this presentation, current practices assessed, and the advantages and disadvantages will be elucidated.

Speaker Bio

Kris Mapili is a Civil EIT at Stantec in Fairfax, VA, primarily supporting conveyance projects and reviews hydraulic and hydrologic analyses for floodplain mapping. Kris graduated from Virginia Tech with a Bachelors in Civil Engineering in 2017 and a Masters in Environmental Engineering in 2019. Her Masters thesis work focused on opportunistic pathogens in water systems.

Thursday, September 2nd, 12:00 PM
Fernando Pasquel, Arcadis
Safety and Resiliency for the once Flood Prone Huntington Neighborhood

Abstract

Communities located along waterways are increasingly at risk for flooding due to increased runoff from impervious surfaces and intensification of rainfall events. The Huntington community in Fairfax County, VA experienced significant flooding from storm events in 2006, 2008, and 2011. To address this problem, Fairfax County completed the Huntington Levee Project to protect the community from tidal surges from the Potomac River and flash flooding from the 100-yr storm in the Cameron Run Watershed. This presentation will discuss improvements to provide flood protection to the community and the challenges with their design. The improvements include 2,800 linear feet of levee and floodwall, drainage improvements and stormwater conveyance systems, a ponding area for storage and routing of high flows, and two stormwater pumping station sized at 45 cfs and 260 cfs, respectively. Considerations for safety in an urban environment include security barriers at the entrances to the major drainage structures and box culverts to prevent unauthorized access to the pump station wet well (such as from curious children in the neighborhood). The interior drainage network incorporated redundancy and overland relief to provide flow-paths to the pump station if the primary drainage structures or security barriers are clogged. Since being placed into operation in late 2018, this Envision Bronze Award winning facility has successfully protected the community from an extreme storm event and flooding from Cameron Run in the Summer of 2019. The design accounted for future sea level rise to ensure the system would provide continuous protection for years to come.

Speaker Bio

Fernando is a Water Resources Manager with 35 years of experience developing and implementing stormwater and green infrastructure programs. He coauthored multiple GI/BMP manuals and was a contributing author for two WEF publications: User-Fee Funded SW Programs and GI Implementation. He is leading the development of the ASCE/WEF manual of practice for O&M of SW Controls. He chairs the Advisory Committee of WEF's Stormwater Institute. He received BS and MS in Civil Engineering from Virginia Tech.

Thursday, September 2nd, 12:00 PM
Dave Caughlin, Structural Technologies
Reestablishing the Structural Integrity of Baltimore's Water Transmission System

Abstract

The City of Baltimore, Department of Public Works (DPW) provides safe drinking water to 1.8 million residential and business consumers, making the City the major water supplier for the Baltimore region. In addition to Baltimore City, DPW supplies water to the surrounding counties including Baltimore, Howard, Harford, Carroll and Anne Arundel. In 2009 the DPW suffered a significant water main break with the failure of its 72-in Dundalk line. This failure prompted DPW to examine best practices in the management of its water transmission main network. Consequently in 2012, DPW embarked on a 10-year plan for condition assessment of its water transmission system. This system is comprised of over 100 miles of 36-120" diameter PCCP and over 1,000 miles of steel pipe. DPW engaged with local consultants and suppliers to conduct a condition assessment of a portion of its system and to determine the risk of failure of individual sections of pipe. DPW also put in place on-call contracts for the anticipated rehabilitation of these pipelines using both traditional methods requiring excavation (dig and replace, external post tensioning, etc.) and the latest trenchless technologies for internal repair (carbon fiber-reinforced polymer lining and joint seals). This presentation illustrates Baltimore's approach to asset management using a series of example projects from 2012 to present. Case studies include an award winning emergency repair project using external post tensioning and a variety of other projects where different rehabilitation methods were used to address pipe with an unacceptably high risk of failure. This plan has enabled DPW to reestablish the structural integrity of the water transmission system at the lowest total project cost.

Speaker Bio

Dave Caughlin has been a Senior Manager with Structural Technologies since September of 2017 concentrating on water and wastewater pipeline rehabilitation projects. Dave worked with many utilities, municipalities and power plants across North America over the last 20 years in the asset management of their large diameter pipeline. Dave graduated from McMaster University in 1991 with a BSc in Bio-Psychology and got his MBA from MAC in 1993.

Thursday, September 2nd, 2:00 PM
Kelvin Coles, Brown and Caldwell
The HGL Control Structure - "The Heart of the RiverRenew Tunnel System"

Abstract

AlexRenew, the water resource recovery facility (WRRF) for Alexandria, VA, is implementing RiverRenew, a CSO tunnel project designed to substantially reduce combined sewage discharges into the city's local waterbodies. RiverRenew includes a deep storage and conveyance tunnel, a diversion sewer, diversion facilities, pumping stations, and the heart of the system – the Hydraulic Grade Line Control Structure (HGL-CS). The purpose of the innovative HGL-CS is to maximize flow to the WRRF and minimize the water surface elevation in the existing interceptor system, which minimizes backwater that contributes to basement backups and upstream combined sewer overflows. The HGL-CS has multiple gravity sewer and force main connections, consists of an upper and lower level, and is equipped with flap gates and side overflow weirs. The structure's unique configuration is designed to control system hydraulics during eight tunnel system operational conditions. During dry weather and smaller storm events, flow from the interceptor system is conveyed through the HGL-CS directly to the WRRF. During rainfall events when the WRRF reaches capacity, the water level will rise and overflow a weir in the HGL-CS. If the tunnel is not full, the water that overflows the HGL-CS weir passes through flap gates and flows by gravity into the tunnel. Once the tunnel is near capacity, wet weather pumps are triggered to reduce the hydraulic grade line in the interceptor system. During large storms, when the tunnel system is at capacity the HGL-CS allows flows to be conveyed to a newly constructed outfall. After the storm events flow collected and stored in the tunnel is conveyed through the HGL-CS to empty the tunnel when the WRRF has capacity.

Speaker Bio

Kelvin Coles is a graduate of Old Dominion University with a B.S. in Civil Engineering and an M.S. in Environmental Engineering. He is a professional engineer with more than 12 years of experience working as an engineering consultant with clients in Virginia and Washington, DC. His notable projects include the DC Water Clean Rivers Green Infrastructure Program and AlexRenew's RiverRenew Tunnel System Program where he currently serves as the Deputy Design Manager.

Thursday, September 2nd, 2:00 PM
Bob Wimmer, ESG
Mythbusters - What can Anaerobic Digestion Really Do?

Abstract

Wastewater treatment has always been a mix of science and art, with extensive modeling and analytical tools available, but coupled with the art and knowledge of experience operators making adjustments based on mixed liquor color and microlifes. With the art also comes a set of preconceptions and in some cases, myths, that need to be debunked in order to push the capacity of treatment works, especially when capital constrains the amount of new tankage that can be constructed. This presentation will take on several of the myths associated with anaerobic digestion and trace the history of the belief, an analysis of the available data and either confirmation of the premise or will bust the myth. The following myths will be tackled as part of the presentation: Digester Loading – Design guidelines and tradition suggest that digesters may only be loaded to 80 lbs of volatile solids per 1,000 cubic feet of volume. Operations at multiple facilities have demonstrated significantly higher organic loading rates. The presentation will detail facilities operating at 2 and 3x the recommended loading rate. In addition, the presentation will review the components of design and operation that permit operation at these higher rates. Digestion of FOG – The upper limit of FOG addition to a digester is listed at 30% of feed by volume. While an upper limit to the amount of FOG that can be added to a digester exists, the variables that determine that limit are numerous and specific to the operation and feeding of the digester. The presentation will identify the variables that impact digester loading, types of materials and signs that digester may become overloaded. Additional digester myths will be evaluated and debunked or confirmed, including, digester mixing, rapid volume expansion, grit accumulation and dewatering impacts.

Speaker Bio

Bob Wimmer is the engineering manager for water/wastewater at Energy Systems Group (ESG). Bob has been working in Maryland for the past 18 years. He is focused on biosolids and energy recovery. Over the past 5 years Bob has designed, commissioned and supported the operations of 6 co-digestion facilities that are accepting more than 20 MG per year of high strength organic waste. He received a BS in Dairy Science and an MS in Environmental Engineering from Virginia Tech.

Thursday, September 2nd, 2:00 PM
Douglas McCauley, DC Water
Identification of Lead Service Lines Through Water Testing

Abstract

Lead is a drinking water contaminant that comes from a variety of sources including faucets and household plumbing fixtures, lead solder used for welding, and lead service lines (LSL) etc. Among those, LSLs are identified as the major contributor of lead in drinking water. Due to adverse health impacts to both children and adults, lead service line replacements have become a prominent priority for water utilities. Service lines are buried deep underground; therefore, positively identifying and locating LSL materials long after installation when information such as tap or build date is unknown are challenges for water utilities to overcome. Unfortunately, this is often the case. This work evaluates using water testing to screen and predict pipe material for premises with service lines of unknown material, confirmed LSLs, and non-LSLs in the District of Columbia. During the study period from 2016 through 2020, a 10-liter customer collected test (also called lead profile) was used to screen for an LSL at a premise with an unknown service line. 10 individual 1-liter samples were collected consecutively after 6 hours of stagnation and tested for lead and tin. Tin was used as an indicator of lead solder. If the profile of lead concentrations shows an increase in lead, typically between liters 4-8, the location was predicted to have an LSL. Over 200 customer collected lead profiles were analyzed for premises with unknown service lines during the study period. Final presentation will include the lead (and tin) results and demonstrate how these data were used in predicting LSL for which later LSL was verified through field investigation. The 2-Liter water testing was useful in identifying lead in water; however, this method is not as effective in identifying LSLs as the 10-Liter test. In the study period approximately two thousand 2-Liter lead tests were conducted. In many cases premises with confirmed LSL showed very low (non-detectable or less than 1 ppb) lead. This may be due to the corrosion control in place or sampling error. On the contrary, there were cases where a premise with no LSL showed presence of significant lead level in water, which could be contributed to by lead solder or plumbing fixtures. The results of the analyses demonstrated that water testing can be effective at identifying the presence of lead pipes. However, the limitations of using water testing must be understood. Collecting water samples required residents to follow correct sampling procedures. Additionally, with the corrosion control treatment in place, low or non-detectable lead levels from water testing does not eliminate the possibility of LSL.

Speaker Bio

Douglas McCauley is a water quality professional with 14 years of experience in the water and wastewater industry. He holds a B.A. in Disaster Management and is studying at Troy University for his M.S. in Environmental and Biological Science. In his current role he serves as Lead Coordinator at D.C. Water.

Thursday, September 2nd, 2:00 PM
Nadia Shebaro, HDR
Visualizing Innovative Treatment – Electronic O&M Development for Information Storage and Access…and Better Biosolids

Abstract

As environmental concerns and wastewater regulations continue to evolve, the wastewater industry and utilities are adopting new technologies and innovative processes for the treatment of wastewater. The successful implementation and effectiveness of these technologies is ultimately fulfilled through proper operation and maintenance and a comprehensive understanding of the treatment processes employed. Operator understanding of the basic theory behind different treatment processes is essential, as is an understanding of the ways in which different treatment mechanisms within a facility operate in tandem. This is particularly true in the context of biosolids treatment, when there is intent to produce a marketable product for beneficial use, and maintaining and optimizing performance of the treatment processes is key. As part of the Biosolids Facilities Upgrades project at Little Patuxent Water Reclamation Plant (LPWRP) in Howard County, MD, HDR has developed an electronic O&M (eOM) manual for the County, which is designed to provide the staff with convenient access to the information necessary to maintain and operate the new biosolids facilities. The upgrades include installation of new solids screening, thickening, and storage mechanisms, anaerobic digesters, gas storage and treatment, phosphorus removal, belt dryers, and deammonification reactors. The eOM consists of an easily navigable interface that stores and visually depicts information on standard procedures, operating modes, process theory, components and equipment data, troubleshooting, safety, and more. Schematics, annotated photos of the new facilities, and annotated screenshots of the BIM model are used throughout the eOM to provide context and clarity. For example, photos are used in conjunction with process control narratives and instrument data, using arrows and callouts to denote flow paths, valves, and instruments where they are installed. The eOM also includes links to relevant sites and documents including as-built drawings, process functional descriptions, manufacturer-provided O&M manuals, and manufacturer websites. To ensure the eOM would be responsive to their needs, the County was consulted throughout the design process, with operators offering their input on the included information and navigation of the electronic O&M. The eOM was developed by HDR as a web application, and it is now stored and run on the County's server. In addition to providing an easy-to-use graphical interface for County staff, the eOM will also provide a permanent archive of stored information, and it is designed to enable easy text editing by the County staff as needed. With this eOM accompanying the facilities upgrade, the necessary information for operators is easily accessible and is stored in one location, streamlining and simplifying the processes of maintenance, operation, and troubleshooting. Additionally, as this project at LPWRP demonstrates, the treatment technologies are not all that is changing; visualization, modeling software, and data storage mechanisms are also facilitating a change in the way that information is stored, communicated, and accessed, and incorporating these mechanisms is key to the fulfillment of a successful project.

Speaker Bio

Nadia is a Water/Wastewater Engineer who has been with HDR in Maryland since 2015. She received her bachelor's degree in environmental engineering from Cornell University in 2015 and is currently pursuing a master's degree from Johns Hopkins University. She has experience working on a number of

water and wastewater treatment plant upgrade projects for various clients in the Maryland area, with a focus on wastewater treatment, nutrient removal, and biosolids processes.

Thursday, September 2nd, 2:00 PM
Kenneth Guttman, Gannett Fleming
Elevated Water Storage Tanks and Cellular Antennas: Untangling the Web of Compliance Requirements and Ensuring Long Term Service of the Asset

Abstract

Elevated Water Storage Tank (EWST) owners and wireless phone/data service providers (i.e. cellular carriers) frequently enter into lease agreements to allow cellular antennas and other equipment on tanks. The mutually beneficial relationship makes sense for many reasons. The carriers gain access to the EWST at the high elevations needed for their equipment to provide cellular service, while tank owners receive revenue for leasing the asset. Antenna projects on tanks are bound by a long list of federal, state, and county laws and regulations with numerous applicable requirements. Determining who is responsible for compliance with these requirements and how compliance is enforced is critical to minimize liability to the tank owner. IBC building code, FCC regulations, FAA & MAA requirements, and industry standards, such as ANSI/TIA-222, are important to both the tank owner and the cellular carrier to maintain compliance. Structural analysis is required to document that added loads are acceptable. Radio frequency electromagnetic energy evaluation is often performed to verify radiation levels are safe for workers and the public. Additionally, consideration must be given to FAA/MAA requirements for crane use and temporary erected monopoles during tank rehabilitation projects that require the removal of antennas. This presentation will showcase one owner's successful tank antenna program that ensured public safety and maintained compliance with applicable laws, regulations, and standards, while protecting the tank to guarantee the long-term service of its tank assets. The goal of the presentation is to inform tank owners of current compliance requirements and showcase the tank owner's successful program, ensuring protection and long-term service of its water tanks.

Speaker Bio

Ken Guttman, PE, PMP, is a vice president with Gannett Fleming. With 24 years of experience in water/environmental design and construction projects, he leads the firm's Construction Management (CM) operations in Maryland, serving state and county government agencies, as well as private clients. He also is Gannett Fleming's national CM Practice Leader. Ken has provided project management services for one tank owner's elevated water storage tank antenna program since 2017.

Thursday, September 2nd, 2:30 PM
Elise Ibendahl, Jacobs Engineering Group, Inc.
Mitigating Urban Flooding in a Combined Sewer Area: A Philadelphia Case Study

Abstract

The Germantown neighborhood, located in Philadelphia along the former Wingohocking Creek, has a long history of wet weather-related basement backups and surface flooding that includes numerous significant flooding events. The nearly 9-square mile sewershed contains over 200 miles of sewer mains of various sizes, geometries, and materials. Consequences of the existing flood risks include an estimated $8.7 million of annual damages. Flooding experienced from three distinct storms since 2004 has caused over $25 million in damages per event. Basement and surface flooding in the Germantown sewershed results from a range of factors, including the limited conveyance capacity of the two existing trunk sewers conveying former Wingohocking Creek flows, the development of the Germantown drainage area, and a natural surface topography that includes numerous bowl shapes that have no overland outlet when sewers are full. The Germantown study planning objective was to determine the optimal and most sustainable combination of structural and non-structural control measures to mitigate the effects of flooding in the Germantown neighborhood while also reducing combined sewer overflows. A screening-level analysis supported the evaluation of over 1,600 unique alternatives with 1D modeling and a high-level costing analysis. Eighty of the most effective alternatives were further analyzed in the linked 1D-2D realm with a HAZUS damage analysis. Two high-performing alternatives were selected for more detailed analysis. The storage tank alternative includes the construction of six tanks throughout the Germantown watershed, while the tunnel alternative combines storm flood collectors with a planned CSO tunnel at the outfall of the watershed. This presentation will describe the project, the extensive alternative analysis process, outcomes, and recommendations, and will summarize the damage and CSO reduction metrics.

Speaker Bio

Elise Ibendahl, PE, PMP, CFM, F.ASCE is the Global Technology Leader for Flood Modeling and Planning for Jacobs Engineering Group, Inc. She has over 23 years of experience in the water resources industry, specializing in urban flood analysis and mitigation design. She has expertise in both 1D and 2D modeling and has performed in the role of project manager and/or subject matter expert for over 70 projects related to flood risk management for Federal, State, and Local entities.

Thursday, September 2nd, 2:30 PM
Lisa Challenger, Material Matters, Inc.
Using Customer Feedback as a Guide for Selecting a New Solids Handling Technology for Kent County, DE

Abstract
The Kent County Levy Court (Kent County), located in Kent County, Delaware, is an excellent example of a successful self-managed biosolids program. Kent County operates the Kent County Regional Resource Recovery Facility (KCRRRF), which serve portions of Kent County and operates at an average daily flow of approximately 14 million gallons per day (MGD). Solids are stabilized through lime addition followed by indirect dryers, where they are dried to approximately 50 to 55% total solids (TS) to create a Class A EQ biosolids product, branded as "Kentorganite." Kentorganite has been successfully marketed and distributed as a combined lime and fertilizer product to over 130 farmers in the program's 30+ year history. While the biosolids management program has generally been successful, the current system poses some challenges. The dryer system is undersized and is nearing the end of its useful life, and lime poses its own set of safety and cost challenges. However, because the farmers in the current beneficial use program have received a lime-amended product for many years, the acceptance of a product without lime into the local agricultural market (and other markets) was uncertain. Kent County engaged the RK&K/AECOM/Material Matters (MM) team to complete the Biosolids Capacity Expansion Project, which evaluated various drying technologies (with and without lime) including high solids alkaline stabilized biosolids (RDP process), alkaline stabilized cake (Bioset or FKC processes), and thermally dried granule, to identify and evaluate the viability of technologies for the site, and to understand whether an unlimed biosolids product would be accepted by their well-established customer base. MM led the market assessment piece of The Project. The assessment included four major steps: a regulatory assessment, biosolids quality evaluation, review of the current land application program, and market interviews. MM used information gathered from each step to identify the benefits and challenges associated with each product as it pertains to the County. The assessment findings were unexpected. The County had assumed that farmers found the product to be "ideal". However, while farmers in the Kentorganite program do appreciate the cost-effectiveness of Kentorganite, and use the product for a variety of reasons, including its liming value, nutrient content, and organic matter, the product is not as "ideal" for the farmers as was anticipated. After demonstrating the increased nutrient value and improved product handleability during on-site interviews, most farmers actually preferred the thermally dried biosolids over the current product due to the significantly higher nutrient content and improved spreadability relative to the current product. Due to the program's strong reliance on the local agriculture community, any product selected for further consideration must appeal to the farmer needs. Because the market assessment findings demonstrated a strong interest in an unlimed, thermally dried granule, the County elected to move forward with a belt dryer technology, making sure to inform the farming community along the way as additional decisions are made.

Speaker Bio
Lisa is a Senior Project Manager with Material Matters. She has experience in marketing, permitting, and managing biosolids and residual materials. Her responsibilities include developing comprehensive biosolids market evaluations, supporting clients with nutrient trading, and evaluating and reporting on

permitting, biosolids product quality, and regulatory compliance. Lisa graduated from Penn State in 2012 with a BS degree in Environmental Resource Management.

Thursday, September 2nd, 2:30 PM
Jessica Hou, Gannett Fleming
Using LiDAR Technology to Untangle the Complicated Web of a Water Treatment Plant Pipe Gallery

Abstract

Three-dimensional design is becoming more and more standard in the water industry. For new designs it is simply a matter of choosing the best software for the project. For improvements to existing facilities this process is more complicated, particularly when no existing record drawings or models exist. This presentation will show how LiDAR, short for light detection and ranging, technology was used on a water treatment plant piping upgrade project to efficiently capture data in multiple pipe galleries. Existing records on the piping within the facilities were not available. Generating design drawings for this project would have required many man-hours of taking measurements and photos and transferring this data into a CAD software package. The use of a small LiDAR unit with real-time wireless processing to an onsite tablet allowed seamless data collection and field quality control in a matter of minutes. LiDAR technology is not new but advances in the technology have reduced costs, shortened processing time, and created more user-friendly applications. After providing an overview of how the technology was used to overcome challenges on this project, the presentation will include discussion of the advantages and disadvantages of the technology along with lessons learned and recommendations for how it can be incorporated into future projects as well as integrated into record maintenance and asset management programs.

Speaker Bio

Jessica leverages nearly 25 years of industry experience to ensure successful project delivery as a senior project manager. In her role as a vice president, she is responsible for driving thought leadership and best practices for water clients. She earned a BS in Civil Engineering and Master's in Environmental Engineering from Old Dominion University. She has held various leadership positions within WEF and AWWA. She serves on the ODU Civil and Environmental Engineering Visiting Council.

Thursday, September 2nd, 2:30 PM
Karen Green, DC Water and Sewer Authority
Journey to DC Water's High-Performance SCADA Interface: Utilizing Situational Awareness to Encourage Operational Optimization.

Abstract

Industrial processes are controlled by operators using several graphic screens and displays to monitor and control SCADA systems. Situational awareness is critical for the safety and efficiency of Water and Wastewater process control systems. Poorly designed Human Machine Interfaces and SCADA graphics increases the likelihood of human error and poor decision making. This have been cited as a significant factor for major accidents. New concepts have arisen in the last few years about how to best deliver efficient information to operators of process equipment. At DC Water, various contractors implemented SCADA graphics and PLC programs without the use of standardized methods, leaving the operators and SCADA Analysts to work with various styles and standards. Graphics were typically colorful, animated, displayed a lot of numerical data, and it was difficult, at a glance, to determine if a piece of equipment was operating within the normal range. Alarm annunciation, descriptions and prioritization were not standardized, and SCADA servers were struggling to keep up with highly animated graphics and often ran high on CPU and memory usage. PLC programs were developed by various programmers which made troubleshooting and maintenance by SCADA Analysts, a lengthy process. Through the collaborated efforts of various teams at DC Water, we developed and implemented PLC and HMI Programming Standards, which has been a great success and we are now reaping the rewards. The objective of our presentation is to foster dialogue and provide attendees with industry related expertise on techniques utilized to advance utility management by developing situational awareness and high-performance graphic approaches. This approach provides a solution to ineffective graphics and optimizes process operations. By presenting best practices and approaches developed and implemented by the DC Water team, we hope to inform attendees on the benefits of high-performance graphics and encourage the audience to assess their current status in operation situational awareness. The topics to be covered include industry trajectory, DC Water's SCADA high-performance upgrade process and design, recognizing abnormal situations, efficient operator onboarding, data overconsumption, identifying operational KPI's to evaluate performance, lessons learnt and optimizing operations. Attendees will have the opportunity to learn effective and practical approaches to designing high performance graphics locally at their sites. Attendees will be able to engage in discussion and ask questions on best practices that resulted in enhanced operator performance. DC Water SCADA team will provide firsthand experience on the process of designing practical and achievable high-performance SCADA interfaces that reflect proper techniques. Our presentation will summarize the lessons learnt from the process of implementing the new standards and highlight the next steps towards optimization.

Speaker Bio

Karen Green is the Sr. Manager, SCADA and Process Control at DC Water and has over 20 years of maintenance and control systems experience in various industries including Oil, Gas and Alumina Refineries. She and her team were instrumental in implementing HMI and PLC standards which highlighted the use of situational awareness for the operators. Karen holds a Master's degree in Electrical and Computer Engineering, with a certificate in Cyber Security from Howard University.

Thursday, September 2nd, 2:30 PM
Ethan Vidal, Pure Technologies, a Xylem brand
The Value of System Control: Lessons Learned from the Chain Bridge Water Main Break

Abstract
How do you respond when the call you have dreaded finally comes in the early hours of the morning? What do you do when there is water gushing out of the street and your entire network is losing pressure? On November 8th, 2019, Arlington County – Water, Sewer, Streets (WSS) suffered a catastrophic failure on a 36-inch high-pressure watermain located under Glebe Road near Chain Bridge. With the break taking out a major roadway as well as occurring at a hydraulically critical junction point, the effects of the service outage had the potential to cascade throughout the Arlington County system. But having - a program of system control assessments to collect information on the condition, location and position of the control valves in this part of the water network, WSS had the knowledge at the ready to - empower their distribution operators to quickly make effective decisions. By operating only the three valves immediately adjacent to the break site within minutes of the discovery of the break, WSS was able to dramatically limit the loss of water and impact to their system, only putting 3 customer connections out of service and saving precious minutes during the first response to the break. One of the valves utilized to isolate the break from the distribution network had only one month previously been buried and deemed inoperable. Under the valve assessment program undertaken by WSS with Xylem, the buried and inoperable valve was exposed and repaired, regaining operability. This presentation will detail the location and impact of the water main break, including a timeline of WSS' response. Lessons learned from the response to the break will be shared, highlighting the effectiveness of the proactive system control and valve assessments in reducing response time to minutes immediately after discovery of a water main break.

Speaker Bio
Ethan Vidal is a Business Development Manager for Pure Technologies, a Xylem brand. He is a professional engineer with over 10 years of experience, specializing in leading linear asset condition assessment projects. He has a Bachelors degree in Psychology from Amherst College and earned a second Bachelors, in Civil Engineering, from the University of North Dakota in 2020. Please come talk to him anytime about Liverpool soccer, bourbon, or valve & pipeline condition assessment projects!

Thursday, September 2nd, 3:00 PM

shikui Bian, DC Water

DC Water at Work: Washout Mitigation of Potomac Interceptor from recent record breaking flooding storms

Abstract

The 50-mile long Potomac Interceptor (PI) sanitary sewer system carries about 60 MGD of wastewater t from two counties in Northern Virginia including the Washington Dulles International Airport and one county in Maryland to the Potomac Pumping Station in Washington, DC, then to the Blue Plains Advanced Wastewater Treatment Plant for treatment before discharging into the Potomac River. The PI was built because of the enactment of Public Law 86-515, by the 86th Congress, on June 12, 1960 to protect the Potomac River from contamination and serve the newly built airport. It authorized the DC Water to plan, construct, operate, and maintain a sanitary sewer to connect airport to the DC sewer system. Right after DC Water engineering competed its Potomac Interceptor erosion inspection report in 2017, DC Metro region experienced torrential storms that breached its record book, in both 2018 for accumulation and in 2019 for single torrential storm, challenging the 50-mile long sanitary sewer along creek crossings at over-crossing culverts and under-crossings at buried sites. In 2018, an unprecedented series of drenching rain storms has catapulted Washington DC to the wettest years on record dated back since 1871. The extreme rainfall has stemmed from a parade of unleashing storms to endure several severe flood events on Washington area. Per National Weather service, there is a 1391 flooding-related reports in the Washington-Baltimore region. This compares to only 262 reports in 2017. In 2019, a 3.3”+/- per hour rain fall, nearly a month's worth of rain in 1 hour on July 8 along Potomac river, set a new single event record as the most torrential rainfall total in the record of DC history, resulting in cars flooding in major commuter roads and at the basement flooding in the White House. These repetitious creeks flooding with fast deteriorating erosions, are pushing the integrity of the Potomac interceptor to a real limit stage tests, testing how DC Water team manage such risk with actionable engineering work to contain the risk of SSO in such environmental sensitive watershed. This presentation aims to highlight DC Water’s collaborated efforts with National Park Services (NPS) and within the asset management task forces, in expediting our engineering and contracting effort to enhance the integrity at the mission critical locations to manage the high-consequence failures caused by mother nature to the minimum.

Speaker Bio

Steve Bian, PE is supervisor of civil and structural design of DC Water Engineering that covers both vertical and linear asset with full spectrum involvement of emergency response, standard development, material selection and CIP. He has been with DC Water since 2005.

Thursday, September 2nd, 3:00 PM
Malcolm Taylor, WSSC Water
Turning Exceptional Quality Biosolids into a Marketable Product

Abstract

Biosolids quality is the major factor determining where and how biosolids are used, and by whom. The benefits of biosolids use on the land are well known. Notably however, there are few examples of Exceptional Quality (EQ) biosolids materials that have been accepted commercially as viable products, such as Tagro and Milorganite™. These soil amendments not only satisfy USEPA Part 503 Class A/EQ standards, but also consistently meet customer specifications and preferences. Public acceptance is earned by consistently producing a product that satisfies regulatory standards (pollutants, pathogen reduction, and vector attraction reduction) while delivering-on customer expectations, including: (1) a low odor footprint; (2) consistent physical and chemical composition; (3) trouble-free dry-stack storability; (4) conventional handling characteristics, and; (5) a clean familiar appearance. Experience has shown that product odor is the key characteristic presenting the greatest challenge to biosolids acceptance. In collaboration with Metro Washington Council of Governments (MWCOG) and DC Water, a research team consisting of members from WSSC Water, Material Maters Inc. and Penn State University conducted a study to identify product curing strategies for HQ biosolids cake that yield beneficial product characteristics that meet or exceed those exhibited by locally-available soil amendment products routinely sold through retail / wholesale outlets. Project Objectives:Objective 1: Quantify the similarities / differences among selected “publicly acceptable” organic soil amendment products versus HQ biosolids. Odor assessments of existing locally-available soil amendments was performed and compared with biosolids characteristics at various stages of curing. Numerous non-biosolids derived products are available for purchase from commercial outlets. Such products have established a clientele that finds these products to be acceptable for routine use. Knowledge of characteristics exhibited by popular competing products (including both biosolids and non-biosolids derived products) will be used in advancing our understanding of acceptable levels of biosolids odor. Objective 2: Quantify the effect of biosolids curing time & turning regimen on odor characteristics, product stability and handleability. As revealed in previous studies, biosolids odors are directly related to storage conditions and time. Controlled experiments employing various bulk storage strategies are needed to better understand the turning frequency and storage duration necessary to significantly reduce nuisance odors and improve handleability of customer-ready products. It is proposed that product stability, as measured by respiratory activity, can be used as an inexpensive field indicator of when nuisance odors have been reduced to acceptable levels. Trials began in Fall 2019 and continue through spring 2021.In this presentation results from all trials are presented. Lessons learned, and comparison of strategies is discussed. Critical concerns and provisions for utilities to implement their own custom fit programs are proposed.

Speaker Bio

Dr. Malcolm Taylor is a principal Environmental Engineer with the Washington Suburban Sanitary Commission. His work focuses on optimization of advanced wastewater treatment processes and promoting the beneficial reuse of biosolids. Before coming to WSSC Malcolm earned his PE as an engineering consultant and taught at Penn State University where he received his PhD in Agricultural

and Biological Engineering. In his spare time Malcolm enjoys surfing &snowboarding, golf, and mountain biking.

Thursday, September 2nd, 3:00 PM
Paul Hargette, Black & Veatch
Algae and Cyanotoxin Source to Treatment Update for Toledo's Collins Park WTP

Abstract

Many utilities have observed changes in their source water quality over the last decade. These changes have resulted in higher levels of algal nutrients, primarily phosphorus, being concentrated in the watershed that can lead to blooms of blue-green algae (cyanobacteria). These Harmful Algal Blooms (HABs) can produce unpleasant taste and odor compounds, geosmin and 2-methylisoborneol (MIB), or even toxins (cyanotoxins). A toxin of primary concern is microcystin that has been detected throughout the United States at concentrations that exceed the Health Advisory value. One well-publicized event related to HABs occurred at the City of Toledo in 2014. The City of Toledo draws water from Lake Erie for treatment at the Collins Park WTP (120 mgd). The lake is subject to harmful algal blooms, and events have resulted in microcystin levels that are 100 times higher than the Health Advisory value. The extreme event in 2014 resulted in a "Do not drink; Do not boil" order for the City's customers. In addressing these issues, Black & Veatch has worked with the City of Toledo on both source water and treatment considerations for dealing with HABs. Related to source water and overall planning, Black & Veatch worked with the City of Toledo and Ohio EPA to develop a HAB General Plan that documents the treatment barriers in place and the performance of these barriers against an extreme extracellular microcystin event. The General Plan includes water quality documentation, evaluation of algae control methods in the source water, and development of a treatment standard operating procedure (SOP) to help operators optimize treatment during HAB events. Treatment modifications at the Collins Park WTP included a series of immediate improvements that were implemented, including permanganate and powdered activated carbon (PAC). Long-term strategies evaluated to deal with algal toxins included: PAC plus permanganate; ozone; and granular activated carbon (GAC). Ultimately, ozone was chosen as the long-term strategy. This presentation will discuss general taste and odor and HAB considerations; the HAB General Plan that was developed including the identified algae control methods in the source water; the details of the evaluation of treatment options; the status of the ozone improvements that are being made at the Collins Park WTP; and lessons learned during startup and commissioning of the ozone system.

Speaker Bio

Paul is a Senior Process Engineer with Black & Veatch in Greenville, South Carolina, specializing in water treatment and distribution projects. Paul has thirty years experience with a Bachelor's Degree in Civil Engineering and a Master's Degree in Environmental Engineering from Virginia Tech and is a member of the American Water Works Association.

Thursday, September 2nd, 3:00 PM
Michael Skerritt, Mott MacDonald
NOT your Average O&M Manual

Abstract

In 2015, DC Water recognized the need for updating and where necessary creating the documentation that governed water and sewer system operation. DC Water recognized that a large amount of operating information resided with the operators themselves who have operated, adapted and optimized the systems through trial and error over the years. DC Water Operations took a long term view and reached out to the DC Water Planning Department to plan and execute a holistic update of the complete body of operating information. Over the years, DC Water commissioned tasks and held a series of workshops to clearly define the structure and organization of operating information, hierarchy of content included in, SOPs, Job Plans (JPs), and O&M Manuals. In this series of tasks, including the 2018 SOP Program, DC Water created SOPs, and JPs for Pumping Facilities, Storage Facilities, Linear Assets, and Administrative , and also a Guidance Manual to write SOPs for continued effort in the area. Following the completion of the SOP program, in 2019 DC Water shifted the focus to updating the existing O&M Manuals. At the time, there was one O&M manual for storage facilities and O&Ms for various pumping station in various formats. DC Water continued the approach to holistically review O&M information, which resulted in a vision of two sets of O&M Manuals that provided operating information for entire water distribution system operations, Water Pressure Zone and Storage Facilities, and Water Pumping Facilities O&M Manuals. DC Water Operations started with the O&M Manual for Water Pressure Zone and Storage Facilities, which was completed in November 2019. The manual was organized to include ten sections, one general section and nine sections which represented each pressure zone in the distribution system. Recognizing that the storage facilities do not have any active operations, the storage facilities were included in within their respective pressure zones. This provided clear relation between the pressure zone operations and storage facilities role in the zone. Details of how each pressure zone interacted internally with critical mains and system PRVs, and externally with adjacent pressure zones could be seen at a glance. The O&M information was tied-in with the operating schematics developed for the entire distribution system and for each pressure zone that provided at-a-glance information of all operating assets in each operating scenario. The key feature of the program was transferability of these documents to DC Water for continued update and the system evolves. In 2019 a complete framework of operating information, which was visualized in the early workshops, materialized with integration with the various levels of operating information (SOPs and JPs) and the existing DC Water Systems of work. This presentation discusses the challenges in setting up the program, which includes collaborating with a wide range of stakeholders from different departments with competing priorities, capturing field knowledge, and getting technical reviews from an increasingly busy field staff, and producing integrated O&M information that relates directly to the structure of the operating staff as well as asset hierarchy.

Speaker Bio

Michael Skerritt is currently a Civil Engineer in Mott MacDonald's Water and Wastewater Division. His education includes a BSc in Civil Engineering and a MSc in Infrastructure. Michael has 10 years' experience in the planning, design, construction, and management phases of multiple projects. These

projects are in the areas of potable water storage and distribution, stormwater management, WWTP Upgrades, earthworks and retaining structures, and road construction.

Thursday, September 2nd, 3:00 PM
Erin Nelson, Corrpro Companies
Break Reduction/Life Extension For Municipal Water Pipelines

Abstract

A 2018 study by Utah State University indicated that the condition of North America's water infrastructure is in a state of steady decline. That research determined that the water main break rate increased 27% for the 6-year period between 2012-2018, with over 80% of the cast iron pipelines currently in service being over 50 years old. Referenced statistics indicate there has been an average of 14 leaks per 100 miles of operating pipeline, and that each mile of pipeline serves approximately 300 consumers. Further increases in water main leak rate represents a major disruption in reliable water supply to a large population. Excluding third-party damage, metal loss as a result of corrosion is the most common cause of premature failure and leakage of buried pipelines. Corrosion is a predictable process, whereas third-party damage is random in nature. Methodologies have been developed over the past few decades to identify anomalies and areas susceptible to active corrosion on underground pipelines. Using the data from these analytics, it is possible to implement local corrosion control to rapidly decrease the water main break rate. Corrpro has developed and applied a methodology to drive this process in a systematic approach. Break Reduction/Life Extension (BRLE) is a proactive engineering program developed to: Reduce the number of future breaks on water system piping and Extend the operational life of existing water system piping. Using a combination of factors, such as pipeline age, materials type and break history, with the data gathered in the field, it is possible to identify activities to initiate measures to reduce the water main break rate. This paper will present details on the BRLE methodology in more detail and provide data from case studies to demonstrate the effectiveness of this approach.

Speaker Bio

Ms. Nelson has 12 years experience in consulting corrosion engineering providing to a variety of industries, with an emphasis on municipal water. Her experience includes engineering and construction of corrosion control measures and CP systems. Emphasis on underground piping corrosion evaluation of buried pipes using statistical analysis as well as design of CP systems for buried pipes. This experience includes testing, evaluation, design and troubleshooting of both ICCP and galvanic CP Systems.

Thursday, September 2nd, 4:00 PM
Andrew Cooper, WRA
Permitting from A to Z - NEPA EA, ARPA, Section 106, Section 408, JPA, ESC, SUP, FONSI with NPS, USACE, MDE, MHT, SHA, CSX, DNR for the CSO System

Abstract
The City of Cumberland has an ongoing program to address their Combined Sewer Overflow (CSO) collection system. To comply with EPA's CSO Control Policy, the City has completed the following projects to date: Mill Race Screening and Odor Control Facility; Evitts Creek Pumping Station, Forcemain, and Gravity Sewer Upgrades; Enhanced Nutrient Removal upgrades at the Water Reclamation Facility (WRF); and multiple additional studies of the system. Additional project phases are under design or construction: Phase I (recently completed) includes a 5 MG CSO storage facility to control overflows occurring at the WRF. Phase II (currently under design) includes a pipeline carrying the overflows from the Mill Race facility to the WRF. The pipeline (designed as a 78-inch conduit to convey 100 MGD) will also collect overflows from two existing diversion manholes (that overflow to the Potomac River during certain storm events) and convey these flows to the new storage facility at the WRF. This portion of Phase II, including preliminary alignment considerations and permitting of the Mill Race CSO Pipeline is the focus of this presentation. Alignment Considerations: The alignment follows the Potomac River and therefore parallels the C&O Canal National Historic Park for a majority of the alignment. There are also a variety of other federal, state, local and private property owners along the proposed route, which complicates access and easement acquisition. Two existing large storm drain pipes drive the CSO pipeline deep — Geotechnical investigations were conducted to determine the extent of rock and the requirements for excavation and trench support. There will be tunnel crossings of roadways and railways. Special considerations need to be given to crossing of the C&O Canal and Towpath. Permitting: Permitting is a critical path for this project, and the discussion will outline permitting procedures, timelines and interdependence. Special Use Permits from the National Park Service (NPS) are required for all studies and fieldwork, and for construction. An Environmental Assessment (EA) is prepared in accordance with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act. NPS and the public review this document, resulting in the issuance of a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS). Parallel to the NPS permitting, the Joint Permit Application for wetland and waterway impacts are pursued with the Maryland Department of the Environment (MDE) and the U.S. Army Corps of Engineers (USACE). USACE also requires a Section 408 permit for work within a flood control structure. And finally, MDE Construction, NPDES and water appropriation and use permits are also acquired, along with local E&SC and SWM permits.

Speaker Bio
Andy is an Associate at Whitman, Requardt & Associates in Baltimore, MD. He holds a bachelor's degree in chemical engineering from the University of Maryland and a master's degree in environmental engineering from The Johns Hopkins University. Andy is a registered Professional Engineer in the State of Maryland, a Board Certified Environmental Engineer, and has thirty years of experience including water and wastewater treatment, pumping and piping system designs, and hydraulic system modeling.

Thursday, September 2nd, 4:00 PM

Joshua Gliptis, Howard County Government, DPW - Utilities

Successfully Building and Commissioning a Biosolids Belt Dryer System – Lessons Learned at the Little Patuxent Water Reclamation Plant

Abstract

In February of 2017, Howard County began construction to improve the Biosolids Facilities at the Little Patuxent Water Reclamation Plant (LPWRP) in Savage, Maryland. The mission of the project is to reduce solids volume and increase solids quality such that it may be utilized in various markets. The project utilized the Construction Manager at Risk (CMAR) delivery process. The existing facilities included lime stabilization and heat pasteurization of undigested solids to a Class A, Exceptional Quality (EQ) biosolid for land application in bulk agriculture. The project was split into two principal phases of design and construction. Construction was substantially complete in May 2019 for Phase 1 which included process upgrades to dewatering, screening, and storage as well as additional anaerobic digestion, phosphorus precipitation, and deammonification processes. Phase 1 allowed the County to transition to a Class B, digested biosolid for land application without the use of lime. The second phase of the project added one of the United States' largest direct-heat, belt drying facilities, and reached substantial completion in December 2020. The dried product is once again Class A-EQ and should allow the County to enter new distribution markets like soil blending. This presentation will review the detailed commissioning and training requirements specified by the project team and delivered by the dryer supplier and contractor. We will highlight some of the nuances of the processes and challenges overcome. We will explain the multi-leveled commissioning process including Factory Acceptance Testing, Site Acceptance Testing, Field Quality Checks, Pre-Demonstration, Demonstration, and Performance Testing. We will illustrate how both commissioning and training must be adaptive and occasionally reworked in a collaborative manner considering things like optional testing protocols and manufacturer's experience and recommendations. The presentation will also highlight some of the challenges working with a foreign manufacturer and building a one-of-a-kind drying facility. Like wastewater reclamation facilities, no biosolids drying facility is the same as another. The LPWRP dryers are some of the largest belt dryers in the United States. Manufacturers of direct-heat, belt drying systems are almost exclusively foreign. Even simple things like making phone calls can be challenging due to time zone differences, unreliable connections, language differences, etc. and cannot be taken for granted. A commissioning plan detailing the resources needed for onsite technical assistance and installation oversight is key. Finally, we will highlight the difficulties created by the COVID-19 pandemic and how the project team met those challenges and implemented mitigation measures including remote dial-in, head-sets, live cameras, 3D imaging, adding Wi-Fi to the building, etc. to minimize schedule impacts and construction challenges.

Speaker Bio

Mr. Gliptis is a Maryland Professional Engineer and Licensed Water/Wastewater Operator with over 21 years of experience in the water sector. He earned his BS in Geo-Environmental Engineering from Penn State University and is currently employed at Howard County Department of Public Works, Bureau of Utilities. Josh has been with Howard County for over 8 years. His principal responsibilities are technical support of the County's water and wastewater facilities and project management.

Thursday, September 2nd, 4:00 PM
Samantha Black, HDR
GAC or IX for PFAS Removal: A Side-by-Side Bench-Scale Comparison Using Improved Methodologies

Abstract

Per- and poly-fluoroalkyl substances (PFAS) are man-made fluorinated compounds that are of emerging concern in the water industry. PFAS are persistent and stable in the environment due to the strong chemical bond between carbon and fluorine atoms. The City of Greensboro (City) has detected PFAS in their finished drinking water as a result of the Third Unregulated Contaminant Monitoring Rule (UCMR). These findings led to a two-year watershed investigation to identify hotspots of PFAS contamination in the City's raw water supply. A combined PFOS and PFOA concentration exceeding the EPA Health Advisory Level (HAL) of 70 ng/L led to the bench-testing, design, and installation of a powdered activated carbon (PAC) system to remove PFAS at the City's Mitchell Water Treatment Plant. Now, the City desires the design and construction of a permanent, full-scale advanced treatment process to provide more robust and sustainable PFAS removal from their water supply. One of the first steps needed to identify an optimal PFAS treatment process is to evaluate . Research to date has shown PFAS removal treatment effectiveness may vary depending on the water source, pretreatment processes, and other operational conditions. Therefore, a technology that works for one utility may not work for another. Additionally, granular activated carbon (GAC) media and ion exchange (IX) resin effectiveness is highly dependent on feed water quality. Therefore, bench and pilot testing under site-specific conditions prior to full-scale design of PFAS treatment systems is crucial. Rapid small-scale column testing (RSSCT) is a proven, quick, and effective method for evaluating the treatability of PFAS using GAC media prior to pilot testing and full-scale design. RSSCT is a less common practice for IX evaluations. Furthermore, there is limited research on using IX at the bench level to assess PFAS treatability. The goal of this bench-scale testing project is to evaluate multiple GAC medias and IX resins in parallel and identify the best media and resin for future piloting, which will occur immediately following the conclusion of bench-scale testing. Previous GAC and IX testing has shown that PFAS removal is compound-specific and impacted by PFAS chain length and the presence other water quality constituents. This presentation will provide a background of the PFAS challenges the City has faced and is currently addressing, in addition to results from the watershed investigation. Results from RSSCT evaluations of GAC media and IX resin will be shared, including total and individual PFAS breakthrough, bed volumes treated, operational cost considerations, and lessons learned to assist with future IX RSSCT studies. Benefits and challenges of GAC and IX for PFAS treatability for the City will also be discussed.

Speaker Bio

Samantha Black is a water/wastewater engineer with HDR. She works primarily on water treatment projects, including pilot and bench scale studies, water treatment design, master plans, and emerging contaminant projects. She is an active member of AWWA and the American Membrane Technology Association.

Thursday, September 2nd, 4:00 PM
Daniel Jeon, Gannett Fleming, Inc.
Smart Water Utility Improvements with AI, GIS-Data Analysis, Digital Technology

Abstract

The Fourth Industrial Revolution talks to the integration of human behavior and artificial Intelligence. The integration of water and sewer utility management into this revolution could be seen as simple as smart meters but is this sufficient and valid to users and decision-makers? As local municipalities and cities are embracing the latest technologies, they are also facing challenges of deteriorating underground utilities. Some of the underground utilities are more than 100 years old close to its breaking point but replacing all of these infrastructures requires significant capital investment. Furthermore, due to recent water conservation efforts by customers, revenues through utility bills are not catching up with required capital costs. Making matters worse, sinkholes and breakages of sewer and water main force them to be subject to regulatory fines, risk of liability, unexpected urgent repair costs, and public safety. By utilizing the digital technology like sophisticated analysis of satellite-derived earth observation imagery and other GIS data, a geospatial Artificial Intelligence (AI) solution can combine remote sensing and data science to identify the conditions under which underground utility failures occur and to quantify the likelihood of failure across the network. Additional geospatial datasets can also be incorporated into asset management to prioritize high-risk assets to improve emergency response and remedicate its risk. With the recent innovation of 5G network, it is no longer science-fiction anymore that a utility operator can access AI-driven data with a handheld device and provide a proactive and timely response to remediate potential risk of utility failures. Furthermore, the AI-driven GIS-data solution can assist interagency communications which are a basis for the smart city concept to provide customers the most efficient services. With proactive and preventive AI-driven smart utility management, it will ensure not only safety for the public and minimize the potential for hikes of utility costs due to extensive utility repairs. Purpose of your abstract, and the expected conclusions: The purpose of this abstract is to demonstrate how the fourth industrial revolution technologies can benefit utility management and interagency communications for smart utility management.

Speaker Bio

Daniel Jeon, PE, PMP is a senior project manager with Gannett Fleming in Baltimore, MD. He worked for over $2 billion program management projects for Baltimore City DPW and New York City DEP and has managed design projects including collection system, water and wastewater treatments and facilities. He received his bachelor's degree in Civil and Environmental from Utah State University and master's degree from Cornell University.

Thursday, September 2nd, 4:00 PM
Ethan Vidal, Pure Technologies, a Xylem brand
Keeping an Eye and an Ear on the "Big Inch"

Abstract

The 108-inch Susquehanna PCCP Raw Water Main, known colloquially as the “Big Inch” provides supply for several municipalities in and around Baltimore, MD. Owned and operated by the City of Baltimore, it runs for most of its length alongside Interstate 95. When the Maryland Department of Transportation announced plans to begin construction on large-scale improvements and widening of I-95, the City needed to find a way to monitor several non-contiguous 1000-ft sections of the Big Inch for 3-9 month periods. The City partnered with Pure Technologies to develop a solution that could detect and immediately alert stakeholders to wire-break distress in the main, while remaining mobile enough to be lifted and shifted to keep up with the various construction sites. Pulling from their extensive experience developing a comprehensive suite of PCCP assessment technologies, Pure Technologies developed Marigold, a remote wire-break monitoring system that was first piloted in the Big Inch in Summer 2019. Introducing an innovative financing approach designed to engage with (and hold accountable) Department of Transportation contractors performing work above and adjacent to buried infrastructure, the Marigold acoustic system has succeeded in ensuring peace of mind for the City of Baltimore and local municipal water owners. This presentation will detail the development and multiple deployments of the Marigold system in the Big Inch, sharing findings, setbacks, and successes of the emerging technology.

Speaker Bio

Ethan Vidal is a Business Development Manager for Pure Technologies, a Xylem brand. He is a professional engineer with over 10 years of experience, specializing in leading linear asset condition assessment projects. He has a Bachelors degree in Psychology from Amherst College and earned a second Bachelors, in Civil Engineering, from the University of North Dakota in 2020. Please come talk to him anytime about Liverpool soccer, bourbon, or valve & pipeline condition assessment projects!

Thursday, September 2nd, 4:30 PM

Monty Simon, Johnson, Mirmiran & Thompson, Inc.

Will My Pump Stations Flood? A summary of Baltimore County's Flood Resiliency Study

Abstract

In the United States, flooding causes more damage than any other severe weather-related event. Impacts to drinking water and wastewater utilities can include loss of power, damage to assets and dangerous conditions for personnel. As storms become more frequent and intense and as sea levels rise, flooding will be an ongoing challenge for drinking water and wastewater utilities. In acknowledgement of the challenge, the Presidential Policy Directive (PPD-21) were issued to advance a national unity of effort to strengthen and maintain secure, functioning, and resilient critical infrastructure, and water and wastewater systems have been identified as one of 16 critical infrastructure sectors. The term "critical infrastructure" has the meaning provided in section 1016(e) of the USA Patriot Act of 2001 (42 U.S.C. 5195c(e)), namely systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.For the water sector, “flood resilience” refers to the ability of water and wastewater utilities to withstand a flooding event, minimize damage and rapidly recover from disruptions to service.Many of Baltimore County’s wastewater pumping stations are located in low-lying areas, along or within stream valleys, and/or close to the waterfront, all of which expose the stations to an increased risk of flooding. Flooding risk is likely to increase over time, as climate change brings more extreme rainfall events, storm surge events, and continued sea level rise in the next several decades. The Baltimore County Department of Public Works intends to take a proactive approach to assess the risk of flooding to its infrastructure and to develop a framework to implement mitigation measures. JMT has been tasked to perform an engineering evaluation of the County’s wastewater pumping stations to identify and prioritize stations that are most at risk to flooding. JMT will conduct the assessment in accordance with guidelines set forth in EPA guidance document EPA 817-B-14-006 - Flood Resilience: A Basic Guide for Water and Wastewater Utilities The presentation will discuss the steps taken by JMT to develop flood risk criteria to allow evaluation of the flood risk potential of each of the 120 Baltimore County owned wastewater pumping stations. The presentation will include detailed assessment of latest geographic weather data including FEMA floodplain storm surges, and sea level rise predictions. The presentation will be useful to utilities and operators considering their facilities risk to flooding and making decisions if an assessment is necessary. The presentation will provide a summary of lessons learned, with focus on method that can be employed to establish critical flood elevations based on evaluation of available floodplain data and predictive models from various federal agencies, including National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), and Federal Emergency Management Agency (FEMA).

Speaker Bio

Mr. Simon has 11 years of experience in the heavy mechanical, civil, electrical, and process control fields. He has extensive water and wastewater experience working as both a contractor, designer, and construction manager. He has served as a project manager on facilities renovation, design, and new construction projects. He has experience in various project delivery methods including traditional Design-Bid-Build and Construction Manager at Risk.

Thursday, September 2nd, 4:30 PM
Eric Auerbach, Arcadis
Sludge Conditioning and Renewable Natural Gas at the Capital Region Water AWTF

Abstract

Capital Region Water (CRW) operates a 22 MGD BNR Advanced Wastewater Treatment Facility (AWTF) with a pair of mesophilic digesters. The digesters are currently undergoing refurbishment including grit removal, new covers, and mixing. To help identify the most beneficial energy recovery project, CRW undertook a comprehensive solids and energy planning effort targeting upgrades to enhance sustainability. The AWTF already had an operational history of recovering its biogas for energy using combined heat and power (CHP) engines. The plant has been operating since 1984 to make electricity and recover hot water for heating. CRW does not utilize the CHP electricity internally, but instead transmits its generated power to the local utility and receives full delivered unit pricing via an interconnection agreement. These engines are reaching the end of their useful lives and are in need of upgrades or replacement. The solids and energy planning effort was aimed at looking at a wide range of options both in conjunction with and in lieu of CHP. The plant currently co-thickens primary sludge and WAS in gravity thickeners, with significant seasonal deterioration in thickening performance. The following enhancement items were examined: separated WAS thickening, WAS lysis for enhanced digestion, new CHP engines with upgraded heat recovery, Biogas to Renewable Natural Gas (RNG), acceptance of High Strength Waste (HSW), backup power generation with CHP, and upgrades to biogas compression and transmission. The key tool used to evaluate all these options and their interacting effects was holistic solids and energy flow model. With this tool, any potential combination of processes or loading rates was quantitatively analyzed for annualized cost, greenhouse gas (GHG) reductions, net power generation, and capital cost. Along with determining an operationally sound and cost-effective treatment facility, processes were also examined to meet goals of maximizing value of the plant's energy resources and supporting the cost-effective Class B biosolids land application program already in place. A sensitivity analysis on both D3 and D5 renewable identification number (RIN) pricing was done using the flow model tool. Ultimately, the decision to target both RNG and HSW acceptance was made. The replacement of CHP engines with new equipment, upgraded heat recovery, and addition of enhanced sludge thickening did not provide an annualized savings to the plant. However, enhanced sludge thickening was viewed as a sound investment providing operators more control over thickening and eliminating the difficulties with seasonal bulking. Savings from other parts of the project would offset this long-term investment in improved operations. The addition of WAS lysis proved to be beneficial on an annualized costs basis, paying for its capital by increasing biogas recovered as RNG and reducing biosolids. With lysis, a cake solids increase of 2-3% is expected which would significantly improve dewatering operations for land application. Based on the results of this work, CRW has moved forward with a detailed design including a new Thickening and Lysis Building to house new WAS thickeners as well as thermal-alkaline WAS lysis.

Speaker Bio

Mr. Auerbach several degrees including a BS in Biological Engineering from Cornell University, a MS in Environmental Engineering from the University of Wisconsin, and a MS in Energy Engineering from the University of Illinois – Chicago. He has worked at Arcadis for 15 years planning and designing biosolids

resource recovery systems at some of the largest WRRFs in the country including Chicago and New York City and serves as the Arcadis as a national lead for resource recovery projects.

Thursday, September 2nd, 4:30 PM

Craig Benson, Mott MacDonald

Turning an Aging Lime Softening Water Treatment System into a State of the Art Membrane MF/NF Treatment System

Abstract

Approaching 40 years in service, this 300,000 gpd, aging water treatment plant needed major upgrades. Located in West Virginia, the existing treatment process consisted of an up-flow lime softening system for hardness, dual media filtration, packed tower aeration, GAC absorption, and disinfection. Source water for the plant provided by three wells is classified as groundwater under the influence of surface water and included the presence of volatile organic compounds and radon contaminants. Due to the presence of contaminants in the groundwater, there was a desire for a strong pathogen and contaminant barrier provided which is provided by membrane treatment systems. The system was designed to remove iron from the well water to bring it into compliance with EPA Secondary Contamination Levels. In accordance with the West Virginia regulators, pilot testing of the MF/NF membrane process was required to demonstrate the feasibility for hardness removal and to establish the full-scale design parameters. Although the raw water hardness can be in the range of 220 – 350 mg/l of CaCO3, a finished water hardness goal of 80 mg/L was required by the client. Both Ion exchange and nanofiltration (NF) were evaluated for hardness removal during design, ultimately, NF was selected to achieve the required hardness removal goals. Extensive water quality testing was performed on the three existing wells, treated permeate, and waste stream. The pilot study confirmed that an integrated MF/NF membrane system would provide a robust contaminant barrier and meet the hardness removal requirements. Removing the existing upflow lime feed WTP system provides room for the MF membranes and clean-in-place equipment. An adjacent area to the main treatment area currently being used as a lime recycling center was considered ideal to isolate the new NF equipment which can operate at higher dB levels. Although the design was developed using the PALL Aria system, the specifications were written as prescriptive allowing for contractors to consider alternate equipment systems. As part of the upgrades, the team provided campus-wide, water quality and control upgrades to the SCADA system. Control strategies were developed to allow for starting and stopping the treatment system in accordance with the 16-hour weekday and 8-hour weekend work schedule identified. To keep the system as simple as possible, the treatment process is designed to operate as three independent systems based upon water levels in intermediate and final system tanks. This includes the well supply, MF/NF treatment system, and the high lift pumping to the distribution system. Vertical turbine “can” pumps were designed to replace the existing centrifugal pumps which required a priming pump. During both the pilot and design phases, the team worked closely with the owner and their representatives to address operational concerns, RFIs, and a temporary MF/RO treatment system.

Speaker Bio

Mr. Benson’s primary areas of expertise and management skills cover the design and operations of treatment, pumping, distribution, and collection of water and wastewater for municipal clients. He has over 28 years of civil engineering experience performing detailed studies, developing design documents, and providing oversight during construction.

Thursday, September 2nd, 4:30 PM
Javier Cantu, Innovyze
AI Enabled Utilities Across the Entire Water Cycle

Abstract

In water and wastewater applications, there is a more critical need than ever for good decision-making data to combat the burdens of climate change, fast evolving regulatory frameworks, market resistance to rate increases, and uncertainties posed by the anticipated retirement of highly experienced workers. There is a lot of research, much of which is being presented on at this conference that teaches us a lot about how we can do better as water stewards. It comes in forms of project delivery, asset management, process optimization, and new innovative technologies. All very exciting topics, with many teams continuously working to improve upon them. With the rise of technology, access to information, and an ever-evolving methods in which we work (Covid being an example as a disrupter), how can we best understand where to prioritize our energy? The answer very much lies in the fundamentals of how we were all taught to operate in our field. Follow the 'Process'. If the Process changes, change the variable affected by the change or add a workflow, revise the process, repeat. Regardless of your field of expertise, I believe we can all relate to as "The Process". This "Process often gets complicated by a myriad of factors such as a changing workforce, technology limits, or quite simply politics. In this presentation, we will cover how artificial intelligence and machine learning evaluates how multiple variables impact desired outcomes, within constraints defined by the decision makers in the application. In other words, how AI, can aid us in "The Process". By analyzing potential outcomes against numerous application variables through a series of machine-learning iterations, an AI solution can learn from ongoing performance and eventually refine control options to meet high-level objectives for improved performance. We will follow the water cycle and discuss how AI process models in water treatment, distribution, collection, and wastewater treatment can all be interconnected to help us manage utilities top-down. We will then apply the same Process principles to the overall water cycle to further help us understand how these AI systems can be interconnected to create an Operations Performance System AI Model that can help us meet organizations sustainability goals, train new employees on best management practices, plan for emergencies, and even help us determine how and when to execute capital improvement projects more effectively. Beyond simply reacting to data collected from our IoT enabled systems, utilizing artificial intelligence in the context of a digital twin utility strategy (aka 'cognitive digital twin') improves the operation of not only our individual systems, but how we manage our utilities. AI has evolved to provide process recommendations as granular as to what setting a pump should be set to, or as expansive as determining budgetary requirements for water vs. wastewater infrastructure all whilst solving how to stretch our operating expenses, increase the efficiency of our operating systems, to become a more sustainable operating entity.

Speaker Bio

Javier Cantu has over 10 years of experience in water and wastewater engineering with a specific focus in process-mechanical and control applications. He is a registered professional engineer in mechanical, civil, and environmental engineering. Mr. Cantu is Director of Smart Utilities and is responsible for artificial intelligence solutions for Innovyze software solutions. In addition to his core responsibilities he serves as a process SME to consult treatment optimization studies.

Thursday, September 2nd, 4:30 PM
Michael Perkins, Brown and Caldwell
AlexRenew's "Smart Utility" Monitoring Technology

Abstract

AlexRenew, the water resource recovery facility (WRRF) for Alexandria, VA, is implementing RiverRenew, a CSO tunnel project designed to substantially reduce combined sewage discharges into the city's local waterbodies. RiverRenew is essential to comply with the Commonwealth of Virginia's 2017 legislation, which requires that Alexandria's four combined sewer outfalls be brought into compliance by July 1, 2025. AlexRenew took ownership of the City of Alexandria's interceptor system, as part of the City's Outfall Transfer Agreement, and plans to implement a data monitoring platform for the combined sewer outfalls and the water resource recovery facility. The platform, called "Smart Utility," will be used to visualize both real-time data (flow, level, rainfall, tide, model output) and provide predictive analytics. Smart Utility will be implemented first on the existing configuration of one of the combined sewer outfalls, Outfall 002, as a performance pilot to establish data sources and develop a predictive model proof of concept. Leveraging the current system as a pilot will provide a future path for applying new technology with the goal of advancing and optimizing local water infrastructure. Once a proof of concept is established, real-time and forecasted data, such as existing flow and level monitoring, USGS Rain Gauge Information, USFS River Level Information, AlexRenew's GIS and Geospatial databases, and hydraulic model outputs, will be used to strengthen the model's ability to predict the likelihood of overflow events. When RiverRenew is fully operational, AlexRenew plans to utilize the technology across the tunnel system to provide decision-making tools while optimizing the operational performance.

Speaker Bio

Michael Perkins is a graduate of Clarkson University with a B.S. in Civil Engineering and University of Virginia with an M.S. in Systems Engineering. He has more than 10 years of experience working as an engineering consultant. His notable projects include the DC Water Clean Rivers Green Infrastructure Program and AlexRenew's RiverRenew Tunnel System Program where he currently serves as the Construction Management Information System Manager.

Thursday, September 2nd, 5:00 PM
Scott Stangle, Arcadis
B Street/New Jersey Avenue Trunk Sewer Rehabilitation and Cleaning Project

Abstract

Introduction/Background The B Street/New Jersey Avenue Trunk Sewer Rehabilitation Project is part of the DC Water Capital Improvement Program, aimed at performing sewer rehabilitation projects throughout the city to prolong the life of the sewer system. This project involves the rehabilitation of the B Street/New Jersey Avenue Trunk Sewer, a 10 to 18-ft. span arch tunnel constructed of aging brick and concrete located in downtown DC from the Smithsonian to M Street, S.W. and impacting several highly trafficked public attractions such as the National Mall. The scope of the project included rehabilitation of approximately 4,350 liner feet of 10 to 18-ft. span arch tunnel and 15 manholes using geopolymer lining. Project Specifics Due to the proximity of this project to several National Park Service locations in the vicinity of the National Mall (e.g., National Museum of Natural History, National Museum of African American History and Culture Museum, Smithsonian National Air and Space Museum, etc.), the work on this project was conducted during overnight hours. Working at night presented unique community outreach challenges that needed to be managed by CM. The CM's community outreach personnel worked tirelessly to ensure all stakeholders received early and on-going notifications of the planned work. The outreach effort included conducting briefings for Advisory Neighborhood Commissions (ANCs) representatives who subsequently approved critical after- hour permits. The project work also impacted secure locations managed by the Architect of the Capital (AOC). Working near AOC secure locations required daily coordination of crews and equipment with several stakeholders (AOC, Capital Police, National Park Police, etc.). In addition to the original scope of arch-tunnel rehab, just prior to the 2019 July 4th celebration expedited support was coordinated by the CM, DC Water, and the Contractor to reinforce the over 100 feet of the arch tunnel in the vicinity of M Street and NJ Avenue S. W. to facilitate the US Government display of heavy military equipment. The route for the display included travel across the arch tunnel. Prior to the celebration, the Contractor had to install emergency bracing to prevent damage to the arch tunnel including a potential collapse. Despite the installation of the bracing, the heavy equipment caused a 167 LF crack in the tunnel was ultimately repaired under a contract change order. The presentation will include an overview of the challenges and the steps required by the project team to implement a successful critical sewer upgrade project under very difficult stakeholder and schedule constraints.

Speaker Bio

Mr. Stangle is a senior construction manager at Arcadis. During his 35 years in CM, he has managed wastewater projects in Maryland, Virginia, Pennsylvania and the District of Columbia. He is thoroughly familiar with both traditional and trenchless methods of rehabilitation. Mr. Stangle experience also includes contracting as he was the general manager to the Mid-Atlantic offices for both Layne Inliner and Insituform for six years.

Thursday, September 2nd, 5:00 PM
Peter Schuler, Brown & Caldwell
Utilizing Progressive Design-Build Delivery to Optimize Capital Spending and Drive Schedule

Abstract

The objective of this project was to design and construct improvements to 28 aeration tanks, 3 blower facilities, 16 secondary clarifiers and other miscellaneous structures at a 64 MGD wastewater management facility (WWMF) utilizing the progressive design-build delivery method. It should be noted that essentially all these process areas had not had major construction performed on them for over 35 years. Originally, the estimated capital cost of these improvements was estimated to be over $200 million and was planned to last for almost 6.5 years including design and operation of a full-scale pilot facility prior to commencing design of the aeration tank improvements. The Design-Builder and Design-Engineer worked collaboratively with the Owner and the Owner's Advisor to reduce the capital budget to $120 million and shave 18 months off the project schedule. This was accomplished by prioritizing the improvements based on real-time cost estimates, breaking the project up into 10 construction packages to allow construction to start while design proceeded in other areas, starting design without pilot results and adjusting the design as more information was developed. In addition, the project team worked collaboratively to develop an aggressive construction schedule that still met the needs of the operations staff at the WWMF. This presentation will include an in-depth summary of the development (and later adjustment) of the program level schedule and budget. In addition, the presentation will identify several of the decision sequences/protocol best practices that proved fruitful on this project. Lastly, the communication strategy for the project will be summarized for the benefit of the group.

Speaker Bio

Mr Schuler has over 30 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 Blown and Caldwell's Charlotte, North Carolina office but works all over the Mid-Atlantic region. Pete's current technical interests include all things wastewater - but especially design build delivery, nutrient removal, biosolids, and new treatment technologies.

Thursday, September 2nd, 5:00 PM
Ufuk Erdal, ARCADIS
Ozone Pretreatment- Is It the Best Approach for Improving Membrane Productivity?

Abstract

Use of membrane filtration in water reuse projects has been significantly increased in last two decades. One major reason for such trend is that membrane filtration provides reliable and robust filtration with virtually solids free effluent. Membrane filtration provides a great disinfection barrier for protozoa and bacteria while also providing some degree of removal for viruses where removal efficiencies depend on membrane pore sizes, cleaning status of membranes, design and operating conditions. In addition, virtually solids free effluent from membrane filtration facilities improves efficacy and often reduces capital and O&M costs of the down-stream disinfection facilities. Despite such benefits membrane filtration facilities generally require high capital and O&M investments. In addition, long organic molecules such as polysaccharides, carbohydrates, etc. can foul the membranes, increase cleaning frequency of the membranes and reduce productivity. The operating pressure commonly referring to transmembrane pressure (TMP) must be increase to match the target water production objectives with increased energy and O&M costs. To manage excessive membrane fouling and restore membrane productivity, a number of approaches have been considered. These approaches include: 1. Use a conservative flux without any pretreatment 2. Use a less conservative flux with pretreatment (metal salt addition) 3. Use a less conservative flux with pretreatment (ozonation) Selecting a conservative flux is generally effective for controlling membrane fouling to meet the desired CIP interval (typically no less than 28-30 days in recycled water applications). The major drawback with this approach is the increased capital cost. The recent studies using ozone for the pretreatment of membrane filtration facilities have shown substantial improvement in membrane productivity. However, such improvements also require high capital and O&M expenditures. In addition, there are some concerns associated with ozone use and they need to be addressed. These challenges include: • Material compatibility • Complex dose control • Manganese and iron fouling • Potential foaming problems In this study, a detailed assessment and comparison was made for a 1-mgd pressurized membrane filtration facility that treats secondary effluent from with and without ozone pretreatment. The determined transferred ozone dose (12-mg/L) and flux improvement for 1-mgd was then applied for sizing and costing the 10 and 50-mgd facilities to evaluate if the economy of scale has any impact on the overall outcome of the study. A number of sensitivity analysis was performed to support the outcome of the study. The study outcome will provide a very valuable insight for agencies and consultants who are designing membrane filtration facilities with and without ozone inclusion.

Speaker Bio

Dr Erdal is serving as the National Practice Reuse Director at ARCADIS with 25 years of diverse experience in planning, design, procurement and commissioning of advanced treatment facilities primarily used in water reuse applications. He got his master and PhD degrees from the Ohio State University and Virginia Tech respectively.

Thursday, September 2nd, 5:00 PM
Prabhushankar Chandrasekeran, Stantec Consulting Services Inc
Framework for becoming the Smart Utility of the Future - Water Research Foundation Project 5039

Abstract

Over the past decade, the global water business and public sector ecosystem have started exploiting the Industrial Internet through the digitization and digitalization of water infrastructure and business processes, towards achieving an integrated enterprise concept at utilities around the world. Despite technological and analytical improvements related to the management of utility data, developing the data strategies and organizational needs of Intelligent Water Systems (IWS) within Smart Utilities is still a challenge. The transformation to a Smart Utility requires a paradigm shift across utilities' cultural, technological, IT, funding, and personnel infrastructure. Several efforts from various research organizations, utilities, and solution providers have pioneered the transition towards a digital and smarter water sector. Nevertheless, the water industry still lacks a comprehensive framework that can guide the navigation to a digital transformation journey in a programmatic way and can bridge existing research efforts to embed digital solutions in everyday utility business practice. With funding from The Water Research Foundation and the participation of ~40 water and wastewater utilities, ~10 solution providers and industry experts, this contemporary project addresses these challenges by providing utilities with a Framework that outlines the definitions and elements of a Smart Utility, particularly related to three key components: people, technologies, and processes. The project also includes the development of an online Maturity Model tool that would provide opportunities for utilities to easily evaluate their digital maturity, as the first key step of the Smart Utility Framework. Definitions and descriptions of a Smart Utility were developed based on the outcomes of an extensive review of the publicly available literature conducted for this study. Developing a one-line, dictionary-style definition of such a complex concept was challenging as one definition would not fit all utility domains and objectives. Rather, these definitions represent a vision or target to be achieved by water utilities and provide a view of what a utility should strive for in terms of its overall activities. Thus, because all water utilities are different, these descriptions were written to be more aspirational than prescriptive. Proposed Definitions: In the absence of a broadly accepted definitions of a Smart Water utility or Intelligent Water System (IWS), definitions were proposed and presented to the participating utilities and project advisors to provide a such definitions. The proposed definitions are: "An Intelligent Water System is a set of interconnected technology components that can collect and analyze datasets from internal and external sources and convert them into actionable information that can be used for automation and/or timely decision support." "A Smart utility is an organization that can configure, apply, and integrate the components of an Intelligent Water System to improve utility business capabilities." Ongoing work: The online Maturity Model tool is being developed through input collected from an in-depth literature review, a water utility survey, interviews with solutions providers, and a workshop of experts. The project is anticipated to be completed by March 2021. The presentation will provide attendees with knowledge of the project's key findings.

Speaker Bio

Prabhu is the North America Practice Leader for Stantec's Digital Transformation and Smart Utility services to our clients. Prabhu assists water utilities in their One Water journey through the implementation of a comprehensive Digital Strategy to enhance utility performance and enterprise

excellence through integration of various initiatives such as asset performance management, operational optimization, energy management, customer engagement, and automated workforce training.

Thursday, September 2nd, 5:00 PM
Lei Fu, Washington Suburban Sanitary Commission
Underground Utility Protection Considerations and Measures

Abstract

Underground pipelines deliver an essential life need, water, to customers and transport wastewaters from them to treatment plants, which is critical for the safety and health of the general public and environments. The pipelines are subject to the impact of environments, such as heavy vehicles, and adjacent construction activities, such as excavations, pile driving, blasting, etc. These activities can cause additional risk to the pipelines. From the owner's perspective, the safety of their assets and the continuous services to their customers are critical factors to be considered when reviewing a developer's project. The developer should engage the asset owner in the early stage of the project to gain a good understanding of the asset and owner's requirements regarding asset protection. This presentation discusses utility protection considerations, such as zones of influence and construction impact analyses, and protection measures from pipeline owner's perspective. WSSC requirements and practices are presented as examples. The information that is conveyed can help developers to gain an understanding of the anticipated the utilities needs and requirements. This in turn can save the developers time and money on projects.

Speaker Bio

Dr. Lei Fu received his PhD degree from Case Western Reserve University. He is a principal geotechnical engineer at the Washington Suburban Sanitary Commission. He has extensive experience in the design, construction, and management of pipeline, tunnel, and dam projects.

Friday, September 3rd, 8:30 AM
Beate Wright, Carollo Engineers
Using CFD Modeling to Visualize and Improve Granular Sludge Separation

Abstract

Granular activated sludge (GAS) consist of dense particles with stratified microbial colonies that provide efficient organics, nitrogen and phosphorus removal along with improving liquids/solids separation in activated sludge systems. GAS has gained broad interest and traction in recent years A growing number of water resource recovery facilities (WRRFs) in the U.S. and abroad have implemented inDense, a technology that uses hydrocyclones to select for GAS by separating it from lighter mixed liquor flocs. While hydrocyclones are an established approach to classify and separate particles in many fields, their application to GAS leaves key questions yet to be answered. Hydrocyclones have been designed, tested, and operated primarily based on empirical field performance data. To date, no group has successfully modeled GAS separation in AS systems by hydrocyclones despite the broad benefits this would bring to many WRRFs, until now. A team comprised of technical experts from equipment inventor, VA and DC utilities, and a consulting team collaborated on this effort to combine inDense installation and performance data from current first full-scale InDense U.S. installations, state-of-the-industry understanding of GAS and inDense systems, and state-of-the-art CFD modeling capabilities. Project findings will be presented, illustrating that CFD modeling developed in this project simulating hydrocyclone GAS separation is a useful tool to inform the design and operation of external selector systems. This will lead to clear visualization of internal separation process, expanding our understating of how to adjust operations to different process and seasonal conditions.

Speaker Bio

Ms. Wright is a professional engineer with over 26 years of experience in organizational leadership, project management, and water operations. Beate is leading the Hydrocyclone Computational Fluid Dynamics (CFD) Modeling Research Collaborative Project. Beate has served on AWWA Technical workgroups, as well as Director of AWWA, and multiple Board positions in Virginia AWWA. She received the AWWA Fuller Award in 2011, and the VA AWWA Herbert W. Evans, Jr. Distinguished Service Award in 2019.

Friday, September 3rd, 8:30 AM
Bisrat Abebe, DC Water
Critical Steel Water Main Condition Assessment on the Hill

Abstract

In 2019, DC Water embarked on an ambitious program to assess its 8th Street NE 66-inch steel water feeder main. With the water feeder main running under busy roads together with other critical infrastructure, a thorough understanding of its condition is key to ensuring the long-term reliability and meeting the maintenance needs of the feeder main. Arcadis and PICA were selected by DC Water to perform the inspection of the 8,200 linear foot long 66-inch steel water main. A key consideration for inspection planning was that the simultaneous deployment of multiple inspection technologies in 6-hour inspection windows was limited by traffic permits as the majority of the alignment is located under the roadway in a busy area of Washington, DC. Additionally, it was understood from the outset that because the results need to be clearly understood and digestible by DC Water staff, the inspection results from the different inspection technologies needed to be integrated into a single interactive presentation medium. PICA employed electromagnetic (EM) inspection technology to obtain wall thickness information on the pressure-carrying steel portion of the water main, CCTV (traditional and high resolution wide-field cameras) to perform a visual evaluation of the internal liner, and LiDAR to assess the ovality. The EM inspections had to be customized in certain areas since EM technologies are always optimized with respect to the material and thickness of the main being inspected. Once the data acquisition phase was successfully completed, the results of the individual inspections were consolidated into a single interactive results table. Because of inevitable differences in the odometer readings between the various technology platforms, the consolidation of distance and location information from the different sources was a challenging aspect of the data integration. Once completed, it proved to be an invaluable tool when trying to understand the different technology results on a per-segment basis, while still allowing the team and DC Water to quickly review the inspection findings of a single technology in detail. The results were subsequently integrated into DC Water's GIS system and used to drive a long-term maintenance plan for the water main. This presentation describes the different aspects of the inspection program, the data integration, and the long-term decisions that flowed from the results of the inspections performed.

Speaker Bio

Bisrat Abebe is the CIP Program Manager in DC Water's Department of Engineering and Technical Services, Planning Division and leads DC Water's condition assessment effort for water and sewer service areas.

Friday, September 3rd, 8:30 AM
Patti Kay Wisniewski, EPA Region 3
Understanding the Risk and Resilience Assessment and Emergency Response Plan Requirements under America's Water Infrastructure Act.

Abstract
This presentation will cover the 2018 America's Water Infrastructure Act Requirements, specifically the Risk and Resilience Assessments and the details of emergency response plans. Emphasis will be on the medium to small sized water systems with 2021 deadlines.

Speaker Bio
Drinking Water Preparedness and Resilience Coordinator, Drinking Water Section, EPA Region 3, Philadelphia. Patti Kay has been with EPA for 35 years performing a wide range of duties including: Consumer Confidence Report, and Public Notification Rule workgroup participation; and implementing climate change initiatives within the drinking water program. She has a BS in environmental science from Cook College, Rutgers University. She is a Silver Water Drop member of the PA section AWWA.

Friday, September 3rd, 8:30 AM
Prarthana Pradhan, Carollo Engineers
Pathogen log-removal credits for membrane bioreactors in potable reuse systems

Abstract
Membrane bioreactor (MBR)-based potable reuse systems (e.g., MBR- reverse osmosis (RO)-ultraviolet/advanced oxidation process (UV/AOP)) face a regulatory challenge compared to more conventional reuse systems (e.g., secondary waste water treatment-microfiltration (MF)-RO-UV/AOP). This is true especially for Giardia and Cryptosporidium log removal values (LRVs) even though research has shown effective protozoa removal by MBR. However, ongoing validation testing at a full scale MBR facility, with Kubota flat-sheet microfiltration membranes is proving the efficacy of flat sheet MBRs in removing pathogens and achieving LRV credits for potable reuse applications. The testing is being conducted at Lake of the Pines WWTP in Auburn, California with a treatment train including an A2O process, MBR, and UV. This study is based on the three tier performance protocols published in Water Research Foundation Project (WRF) 4997 and 4999 which define LRVs for MBRs. In the tiered system, detailed validation studies can be performed to prove exceedance of conservative default LRVs (1-log viruses, 2.5-log protozoa) under a restricted operating range (Tier 1), system specific MBR LRVs (Tier 2), or to demonstrate a correlation between surrogate parameters and LRVs (Tier 3). The parameters that were monitored in this study included human pathogens, operational and water quality parameters, and surrogates such as turbidity, total suspended solids, somatic coliphages, male-specific coliphages, Clostridium perfringens spores, and pepper mild mottle virus. Results to date of LRVs have shown >4 for virus, >3 for Cryptosporidium and >5 for Giardia removal which exceeds conservative default Tier 1 LRVs assigned to MBRs under a restricted operating range. Furthermore, the plant under evaluation utilizes 10-year-old membranes which are close to the typical end of life. This demonstrates that MBRs with flat-sheet membrane units can reliably remove protozoa and virus throughout their typical product life cycle and have the potential to be credited for high LRVs in potable reuse applications under WRF's Tier 2 and 3 approach. The paper will present results from the validation study along with correlations of monitored surrogates with LRVs based on WRF's three tier validation approach.

Speaker Bio
I graduated with a Master's Degree in Environmental Engineering from Virginia Tech in 2018. I joined Carollo Engineers after grad school and have been working there for about 2 years getting involved in various water, wastewater and reuse related projects.

Friday, September 3rd, 9:00 AM
Rebecca Bowman, National Society of Professional Engineers
Knowing When You're Standing on the Edge of an Ethical Cliff

Abstract

Understanding what to do when faced with an ethical dilemma is important. However, recognizing a ethical dilemma is better. And recognizing an approaching ethical dilemma is best. This seminar will focus on clues, symptoms, and indicators to help practitioners recognize, address, and avoid situations which give rise to ethical dilemmas. Attendees will also explore resources and tools to help them confidently face those situations. The seminar will also cover related aspects of insurance coverage and legal liability.

Speaker Bio

Rebecca A. Bowman, Esq., P.E. is the 35-year principal of a woman-owned business in civil engineering, dispute resolution, real estate, and legal services. She is a registered Professional Engineer, a licensed attorney, and a certified arbitrator/mediator. She has her B.S.C.E. from the University of North Dakota, M.B.A. from Oklahoma University, and J.D. from Duquesne University. She is the Senior Director of Ethics and Professional Practice for the National Society of Professional Engineers.

Friday, September 3rd, 9:00 AM
Dian Zhang, Stantec
Impact of Thermal Hydrolysis Pretreatment and Anaerobic Digestion on the Formation of Dissolved Organic Nitrogen Recalcitrant to Aerobic Incubation

Abstract
This study for the first time tracked the turnover of dissolved organic nitrogen (DON) in the thermal hydrolysis pretreatment (THP) operated at different temperatures and followed by anaerobic digestion (AD) and/or aerobic incubation (AI). The results showed that THP at the temperature ranging from 110 oC to 190 oC substantially increased the levels of recalcitrant dissolved organic nitrogen (rDON) by 110-310% as defined by the DON that can survive aerobic biodegradation. Regardless the THP temperature, rDON made up 14-16% of the DON generated from THP and 71-77% of the DON coming out of the THP-AD. The mesophilic AD operated with 15 days of hydraulic retention time cannot reduce the total rDON level but did increase the high molecular weight fractions of rDON, recalcitrant soluble chemical oxygen demand (rSCOD), color, and UV-quenching. Because of this anaerobic transformation, the strong correlation (p-values < 0.05) of rDON to the THP temperature, rSCOD, color, and UV-quenching as detected in the THP effluent disappeared when AD was involved. Attention should be paid to the role of AD in transforming the characteristics of rDON returned to the mainstream treatment trains.

Speaker Bio
Dian is a wastewater and bisolids process engineer at Stantec. He holds a PhD from Virginia Tech and authored more than a dozen peer-reviewed papers related to biosolids management. Key experiences include pilot studies, design, and business case evaluations for anaerobic digestion, thermal hydrolysis pretreatment, biosolids dewatering, and energy recovery.

Friday, September 3rd, 9:00 AM
John Civardi, Mott MacDonald
Looking at Lead from a Different Perspective - the Role of Water Quality Profiling/Sequential Sampling

Abstract
The Pittsburgh Water and Sewer Authority (PWSA) has engaged in an intensive investigation to reduce lead at the point of use. Orthophosphate addition was implemented in April of 2019 in a phased approach. Prior to the release of the Draft Lead and Copper Rule Revision, the PWSA enacted a home profiling (sequential sampling) program. The home profiling program was initially used to assess the effectiveness of the orthophosphate addition. Home profiles were collected on multiple occasions prior to the addition of orthophosphate. Upon addition of orthophosphate, these homes continue to be "profiled" as part of PWSA's corrosion control optimization program. In addition to these baseline homes, PWSA also performs an investigation of homes with a first draw lead concentration above 15 ppb in an effort to determine potential causes of the elevated levels. This home investigation program has many similarities to the Proposed Lead and Copper Rule "find and fix" program of investigating houses. As part of this supplemental lead profiling program, homes that have previously tested high and low from the LCR sampling pool were invited to participated in the program. "Low" lead homes were used to compare the differences in water quality and water use patterns to the "high" lead homes. Upon acceptance into the program a home visit is scheduled to inspect the premise plumbing. The plumbing is measured by length and diameter so that a schematic can be drawn and the volume in each segment of piping computed. On the first visit a grab sample is collected to be analyzed for metals; in addition, field parameters such as, free and total chlorine, orthophosphate and pH are collected. Sequential profile sampling bottles are left with the homeowner so that they can perform sampling. The water quality data is graphed in regard to the pipe type and volume of water. The results are reviewed for where the lead is released and what form of lead is being released. The program also further investigated sites near the profiling sites including hydrants and Revised Total Coliform Rule (RTCR) sites. This data enabled an assessment of how water from the distribution system is impacting water quality within the home. Through the home profile program, we have been able to determine factors that contribute to lead release. Water usage, dissimilar metals, and aerators have all played a significant role in the release of lead. The field results have provided guidance as to how the orthophosphate concentration varies within the distribution system. We have found that some profiling sites may have low orthophosphate residual while one street away a profiling site may contain a much higher orthophosphate residual. The program has also discovered that often times the highest lead levels occur in samples after the first liter and this helps PWSA to identify the sources of lead release and to identify corrective actions. The profiling program is applicable to all water systems that have lead this presentation will provide guidance on how to set up and implement the profiling progrram

Speaker Bio
Mr.Civardi is a PE and has 34 years of experience in the evaluation and design of water treatment plants and distribution systems. He is Mott MacDonald's Global Practice Leader for Water and Wastewater Treatment. He is the co-author of AWWA's Iron and Manganese Treatment Handbook, 2nd edition

Friday, September 3rd, 9:00 AM
Angela Leersnyder, ORISE Fellow at U.S. EPA
Water Contamination Incident Preparedness: Analytical Support Planning

Abstract

Drinking water and wastewater systems face major challenges when confronting a natural, accidental, or intentional contamination incident. These types of events can occur at any time. Emergency preparedness and rapid response remain a priority to ensure the water sector can effectively and efficiently address contamination incidents. This includes being prepared for unforeseen analytical challenges that may result from sample surges or unknown contaminants. EPA's Water Security Division (WSD) has created multiple tools to help utilities be ready when emergency strikes. To assist with analytical challenges, the Water Laboratory Alliance (WLA) program was formed in 2009. The WLA is a nationwide network of laboratories with the capacity and capability of testing water samples for chemical, biological and radiochemical contaminants. This network helps laboratories and utilities respond to water contamination events. The WLA is part of the Environmental Response Laboratory Network (ERLN) and consists of over 140 state, utility, public health, environmental and commercial laboratories. The WLA program is intended for drinking water and wastewater utilities of all sizes, emergency managers, on-scene coordinators, first responders, state and local government officials, and public health officials. The WLA also offers a host of tools, resources and best practices to help facilitate successful and timely incident response. These include guidance documents as well as live and online training opportunities. This presentation will provide an overview of the WLA program's three main pillars: communication, preparedness, and response. It will focus on five helpful water security resources that provide support under those pillars. These resources are the Water Laboratory Alliance Response Plan (WLA-RP), Analytical Preparedness Self-Assessment (APS), Water Contaminant Information Tool (WCIT), Analytical Preparedness Full Scale Exercise Toolkit (AP-FSE), and the Laboratory Compendium. These resources work together to assist with the development of emergency response preparedness plans and training exercises to test and keep plans updated.

Speaker Bio

Angela is participating in an ORISE fellowship with the EPA's Office of Water. Her participation is focused on the Water Contamination Information Tool. She has a B.S. in Chemistry and minor in Math from the College of William and Mary. In undergrad, she joined an organic chemistry research lab focused on synthesis, earned a research grant for Summer 2019, presented a poster at the National Organic Symposium, and her work was included in a paper in the Journal of Organic Chemistry in June 2020.

Friday, September 3rd, 9:00 AM
Greg Knight, Black & Veatch
Delivering the Benefits of Sidestream RAS Fermentation: Full-scale Experience at Charlotte Water's McAlpine Creek WWMF

Abstract
Charlotte Water's 64 MGD McAlpine Creek Wastewater Management Facility (WWMF) operates two parallel treatment plants (North and South) consisting of primary sedimentation, activated sludge in an A/O configuration, secondary clarification, and common effluent filtration. Solids treatment includes gravity thickening of primary solids, centrifuge thickening of waste activated sludge (WAS) followed by anaerobic digestion and dewatering of combined primary and WAS to produce Class B biosolids. Historically, biological phosphorus removal resulting from the existing unaerated zones has been limited and the plant has used ferric chloride dosing to meet a TP limit of 1mg/l. In 2019, a trial was carried out over a period of 9 months on the North plant to evaluate the potential to improve biological phosphorus removal by constructing two full-scale sidestream RAS fermenters within the existing aeration tanks (ATs). Each fermenter served a portion of the North plant with the plant divided into two completely independent activated sludge systems. The trial allowed for the evaluation of two different fermenter sizes equivalent to 6% and 10% of the aeration volume. The fermenter with 6% of the aeration volume achieved an effluent OP of 0.58±0.43 mg-P/L whereas the fermenter with 10% of the aeration volume achieved 0.30±0.39 mg-P/L. Following the success of the trial, Charlotte Water has proceeded with the installation of an Interim Fermenter (I/F), the purpose of which is to gain longer term operating experience with sidestream RAS fermentation, to determine whether to implement a permanent system at the facility. The design of the I/F was based on lessons learned during the pilot study regarding fermenter volume, hydraulic retention time, solids retention time and management of solids inventory and scum. A single fermenter was constructed with a process volume equivalent to 13% of the total North plant ATs with the North Plant converted back to a single activated sludge system. The system has been operating since September 2020 and this paper will provide a summary of the commissioning, optimization and operation of the facility. Purpose (200 Characters): The purpose of this presentation is to share experience with the full scale design and operation of sidestream RAS fermentation at Charlotte Water's McAlpine WWMF.

Speaker Bio
Greg is an experienced Process Engineer with 20 years history in the water industry. Greg has worked for Black & Veatch for the last 14 years specializing in wastewater and biosolids. His previous roles include Plant Manager of a large potable water treatment plant in the UK and 3 years Voluntary Service Overseas in Ghana (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.

Friday, September 3rd, 9:30 AM
Eyasu Yilma, DC Water
Risk Management on the Potomac Interceptor

Abstract

The Potomac Interceptor (PI) sanitary sewer system is an over 40-mile long reinforced concrete pipe sewer ranging in size from 36 inches to 96 inches in diameter. It is designated as a major asset within the District of Columbia Water and Sewer Authority (DC Water) sewer system. It conveys approximately 60 million gallons per day (MGD) by gravity from service areas in Virginia starting near the Washington Dulles International Airport to DC Water's Blue Plains Advanced Wastewater Treatment Facility. This presentation will describe the methods and procedures used by DC Water to manage risk of failure posed on the Potomac interceptor from external factors including public constructions, private development and natural disaster. It will explain procedures developed by DC Water to ensure the safety of the PI, and emergency response protocol to be activated in time of emergency. The PI traverses along several counties, private spaces, Federal and Regional Parks. Highways, and Metro rail lines cross the PI at several locations. Most of the PI is located close to the Potomac River, and several small creeks crosses the PI through a culvert to discharge into the Potomac River. DC Water has easement of 75 feet wide along the PI. Within the PI easement, there are roads, bridges and Metro rail lines that are on top of the PI and poses risk for the PI due to loads, and vibration that occurs during maintenances DC Water has developed construction standards that contractors should comply with working in the PI easement. The standards of construction require developers to define their zone of influence of their development work and verify no risk on the Potomac Interceptor from traffic load, pile construction, vibration, and in rare case connecting laterals to the PI. DC Water has successfully implemented this procedure during SilverLineMetro rail construction which crossed the PI at eight locations. Currently DC Water is working with Virginia Department of Transportation (VDOT), and Maryland Department of Transportation (MDOT) at Route-7 and I-495, PI crossing to protect the PI from risk caused by road expansion. In 2019, DC area has recorded a 100 years' flash flooding which nearly eroded the Potomac Interceptor. The occurrence of SSO (Sanitary Sewer Overflow) has increased due to storm related Infiltration and Inflow Impacts of the severe rain events to the PI includes manhole Pop-Up, and eroded PI support. DC Water has been working with National Park Service (NPS), and Washington Suburban Sanitary Commission (WSSCWater) to increase the resilience of the PI system during heavy rain events. This presentation will also describe an innovative idea used to strength the PI manhole (MH's) resistant to an uplift pressure by reinforcing it with a glass fiber, and methods proposed to protect exposed PI sites from erosions. DC Water has prepared an Emergency Response Plan for PI sites identified as vulnerable as discussed above, which is caused by both internal corrosion and external loads. This presentation will describe the emergency response plans prepared for vulnerable PI pipeline segments and/or sites.

Speaker Bio

Eyasu Yilma, has a masters degree in Water Resources Management from University of Luneburg Germany, and has more than 20 years of Engineering consulting experience in three continents in Germany, USA and Ethiopia. He has authored several documents in use by DC Water including Potomac Interceptor Renewal Report, and Multi-Jurisdiction Use facilities cost share. Now Mr. Yilma is a manager for Potomac Interceptor Sewer System for DC Water.

Friday, September 3rd, 9:30 AM
Yong Kim, UGSI Solutions, Inc.
Coagulant/Flocculant 101 – Basic Chemistry, Handling/Storage, Activation/Mixing, and Optimization

Abstract
Since the chemistry of coagulant and flocculant is very different each other, the mechanism of coagulation and flocculation is also fundamentally different. Various topics regarding coagulation and flocculation are discussed from the perspective of engineers and operators. That includes a summary of available chemicals, preparation before application, injection methods, and typical dosages for wide range of processes. Three types of polymers are discussed regrading physical form, molecular weight, charge density, and size distribution. Proper way of handling and storage of dry or emulsion polymer is reviewed as well as the shelf-life of neat polymer and diluted polymer solution. The use of solution viscosity will be discussed as a reliable measure of the efficiency of polymer solution. Quality of dilution water has serious impact on the efficiency of polymer solution. Hardness representing a major portion of the ionic strength of dilution water plays an important role in polymer activation. Considering the increasing trend of utilizing reclaimed water for polymer mixing at wastewater treatment plants, chlorine level of dilution water must be checked due to its oxidative attack on polymer chains. When reclaimed water is used, aging of polymer solution must be carefully evaluated. Chlorine, suspended solids, and dissolved ions included in reclaimed water are reacting with polymer and resulting in degraded polymer solution during aging. Benefit of two-stage mixing and sufficient residence time in polymer make-down has been well accepted in water industry, and it was clearly shown at the Neshaminy Water Treatment Plant in Philadelphia area. Two different mixing chambers were evaluated side-by-side in dewatering alum-carbon sludge with two belt filter presses running simultaneously. It was striking to observe that the redesigned mixing chamber with tripled residence time performed 35% better than the other, while yielded to 4% drier cake. Related to optimizing polymer activation/mixing, Jacobs Engineering performed several-month long pilot study at the F. Wayne Hill WRC of Gwinnett County, GA. The plant has a rated capacity of 60 MGD and spends approximately $1.2 million of cationic polymer per year for thickening and dewatering. Three polymer mixing systems from different vendors were evaluated for dewatering by monitoring polymer dose required, polymer solution concentration, cake solids, and TSS level of centrate. The result of pilot study demonstrated that a well-designed two-stage polymer mixing system was able to reduce polymer consumption by 25%, while produce better quality centrate without sacrificing cake solids.

Speaker Bio
Dr. Yong Kim is Technical Director at UGSI Solutions, Inc., Vineland, NJ. He was previously employed by USFilter and Siemens Water Technologies. He is an active member of the Solids Separation Subcommittee of WEF/RBC Committee. As a PhD Chemical Engineer, he has authored a book entitled “Coagulants and Flocculants: Theory and Practice.” During his 33 year’s professional career, he published over 40 technical papers with seven (7) US Patents issued to his credit.

Friday, September 3rd, 9:30 AM
Teresa Wong, Mott MacDonald
An Incentivized Approach to Replacing Lead Water Service Lines

Abstract

How does a utility with 25,000 lead service lines accelerate replacements? The District of Columbia Water and Sewer Authority (DC Water) has taken a two-pronged approach: (1) establish a District-wide lead service replacement program (Lead Free DC) and (2) amend the Lead Service Line Priority Replacement Assistance Act of 2004. This amendment, the Lead Water Service Line Replacement and Disclosure Amendment Act of 2018 (D.C. Law 22-241), incentivizes homeowners to replace their lead service line by mandating lead plumbing disclosures to tenants and potential buyers and by establishing two publicly funded affordability programs. The first program requires that public funding be used to cover 100% of the private lead service replacement costs when DC Water replaces the public lead service line during planned infrastructure work or emergency repairs. The second program establishes the Lead Partial Replacement Assistance Program (LPRAP) to replace private lead service lines where the public lead service line was previously replaced. Homeowners are eligible to receive a 50% (capped at $2,500) discount on replacement costs regardless of income, and low-income homeowners are eligible for an 80% to 100% discount on replacements costs. This presentation will focus on LPRAP and the lessons gleaned from the inaugural year. LPRAP is a unique program in that it specifically targets partial lead service lines and the homeowner is responsible for selecting and contracting a plumber. DC Water and the Department of Energy and Environment (DOEE) co-administer the program solely to certify the lead service replacement work and to approve income-based financial assistance, respectively. The challenge for DC Water and DOEE is therefore to ensure that the replacement work is performed in accordance with regulatory standards and that District funds are used appropriately, whilst engaging small-businesses and allowing the homeowner and the plumber to dictate the scope, construction methodology, schedule, price, and contract terms. This presentation will cover: The establishment of reasonable caps for lead service replacement work The development of an Approved Contractors List and contractor training The development of a permitting subprogram to assist plumbers with the acquisition of Public Space Permits and streamline the review The development of a field inspection subprogram to confirm the reasonableness of cost and certify the lead service replacement work Opportunistic relocation of nonconforming curb stops to the property line

Speaker Bio

Ms. Teresa Wong has nine years of experience in the environmental engineering field, including water pipelines and networks, water resources, stormwater, waste, and air quality management and regulatory compliance. She currently serves as Program Manager of the Lead Partial Replacement Assistance Program (LPRAP) in Washington, DC. Ms. Wong received her B.S. in Environmental Engineering from Cornell University and is a registered Professional Engineer in Maryland.

Friday, September 3rd, 9:30 AM
Robert Ryall, Arcadis
Show Me the Money! Exploring Utility Workforce Retention and Compensation; Harford County, Maryland DWS

Abstract
Employee retention and the cost and knowledge loss from turnover present a major challenge for any organization, but especially for a utility, which provides essential around-the-clock services to its customers. The Harford County, Maryland Department of Public Works Division of Water & Sewer (DWS) had experienced employee turnover in critical positions: • Plant Operator • Water/Sewer Utility Worker • Facility Mechanic As a result, DWS commissioned a study focused on understanding and analyzing their employee turnover. The study compared internal County data related to the affected DWS career ladders (pay scale, employee departure information, performance feedback, benefits), with corresponding positions at five other peer Maryland utilities. A survey was developed specifically for this study, and incorporated retention metrics from regional and national utilities. In addition to comparing employment trends of other utilities, the study reviewed other alternative occupations (outside of Water & Sewer) that have been reported to be sources of employee transition. These competing occupations included contractors (general construction), truck driving positions requiring Commercial Driver Licenses (CDLs), warehouse/distribution center positions, equipment operators, and other County positions within the Highways Division of the Harford County Department of Public Works. Some pertinent results from the study include the following findings: • Approximately 62% of departures were either resignations or terminations, with the remainder being retirements, relocations, and transfers. • The average Plant Operator annual salary, based on the survey results, was $48,700. • Annual vacation leave is depended on years of service; at 10 years of service the average vacation leave averages 16.3 days among the survey participants. • Within Harford County, utility workers in the Highways Division were more highly payed than DWS utility workers • From the alternative occupations analysis, DWS worker compensation was comparable to other competing industries. • Since 2015, County salary increases have been consistent and competitive. • County is paying below peers at the trainee (entry level) positions. • County is paying below peers at all career-ladder steps for the Water/Sewer Utility Worker classifications. • There are strong salary competition pressures, both externally and within other County organizations, for positions with license or certification requirements. As a result of findings generated as part of this study, Harford County performed broad salary adjustments for 65 employees across the three DWS career ladders. This presentation will focus on the challenge of workforce retention, the methodology and development of the survey complete for DWS's study, results of the comparison survey, will explore the various strategies for employee turnover mitigation proposed to the County, and will update on actions the County has taken in response to this study. As a result of this presentation, the audience will learn: 1. Methodology used for developing utility retention surveys. 2. Using survey data to "make the case" for improving employee compensation 3. Results of the Retention Survey completed as part of this effort 4. Trends in utility employee turnover 5. Trends in utility employee compensation 6. Considerations for mitigating employee turnover 7. Response actions and results the County has taken

Speaker Bio

Mr. Ryall has served the water industry for over 20 years and leads Arcadis's Water Financial Services Practice. His experience includes providing rate and financial management consulting services to water, wastewater, and stormwater systems. He has experience across the United States and provides advisory services to some of the Nation's largest utilities. Mr. Ryall has is a contributing author to industry manuals of practice and is a frequent speaker and national and regional water events.

Friday, September 3rd, 9:30 AM

Pusker Regmi, Brown and Caldwell

What did we learn from the full-scale implementation of the continuous flow aerobic granular sludge process using an external selector?

Abstract

Introduction: Hydrocyclone is a promising technology for the creation and selective retention of granules when coupled with proper loading conditions. The main benefit of hydrocyclone, which is a retrofit technology is that it can be implemented in continuous flow systems without any interruption to the existing process with minimum process modifications. This paper provides the account of hydrocyclone based wasting in a full-scale US facility. The goal is also to present design considerations, process goals, performance enhancements in terms of settling characteristics and effluent quality. Material and Methods: Implementation of this selective wasting consists of a battery of hydrocyclone installed on the waste line of an activated sludge process where the wasting originates from the underflow of the secondary clarifiers or directly from the basins. The hydrocyclone are fed a portion of the return activated sludge (RAS) and the feed rate is based upon the targeted wasting of the lighter poorer settling solids from the overflow serves as the waste activated sludge (WAS). The overall plant performance and densification as result of hydrocyclone based wasting was assessed by monitoring following: • Effluent quality: Nitrogen (N) species, total phosphorus (TP), turbidity • Operational parameters: Solids retention time (SRT), temperature, dissolved oxygen • In-reactor performance: ORP, OP, N species profiles • Ex-situ batch activity measurements: ammonia-oxidizing bacteria (AOB) and nitrite-oxidizing bacteria (NOB) rates, Phosphorus release and uptake test (tests involved P release by mixing primary effluent and RAS (50:50) followed by splitting the sample evenly to conduct anoxic and aerobic P uptake tests) • Densification measures: Sludge volume index (SVI in 5 minutes and 30 minutes), Sieve analysis (200 µm), extra polymeric substances (EPS) of mixed liquor of hydrocyclone – feed, underflow and overflow Summary: The main purpose is to understand short-term and long-term changes to the activated sludge settling characteristics, microbial diversity, and nitrogen (N) and phosphorus (P) removal performance because of hydrocyclone based wasting. Hydrocyclone based wasting was effective in improving settling characteristics (SVI < 80 ml/g, % TSS > 200 µm > 50) within few weeks of operation. Heavier biological P removal organisms are selected by hydrocyclone to promote a combination of improved settling and phosphorus removal. Excellent effluent quality (TP < 0.5 mg/L, Turbidity < 2 NTU) was observed. Hydrocyclone based wasting can be an effective alternative to achieve sludge densification within continuous flow systems while maintaining high effluent quality.

Speaker Bio

Dr. Pusker Regmi is a Licensed Professional Engineer and Process Engineer with Brown and Caldwell in Washington D.C. area. He has wide-ranging experience in research and development as well as the design of innovative biological nutrient removal technologies. Pusker is the author of over 30 publications in peer-reviewed international technical journals and proceedings of national and international conferences.

Friday, September 3rd, 10:00 AM
Pat Burke, Ferguson Waterworks
Clearwater Challenge- Pitch contest to look for innovation in inflow and infiltration

Abstract

5 Utilities (WSSC Water, Anne Arundel County, City of Baltimore, Howard County, and ALCOSAN) partnered with Ferguson Ventures to create a pitch challenge. The problem- We are looking for innovative ideas that could address this critical issue. You need not have an actual product or service to be eligible to compete in this open challenge. Over the years, wastewater treatment plants notice high flows due to constant intense rain events, leaking pipes, and other unknown conditions. Increased water flows create significant issues in terms of operational costs and effectiveness, and permit compliance. We seek solutions to radically improve the detection of Inflow and Infiltration (I&I) into sanitary sewer systems, with the goal of better identifying opportunities for detection, quantification of flow and intervention to reduce excess water flow. Ideally submissions will address detection, quantification and remediation of Inflow & Infiltration. We will also accept submissions that solely address detection and quantification. The Solution- In the end we had 7 abstracts coming from startups and companies all over the world. There ended up being 2 winners- best current solution and best upcoming solution. As Utilities and vendors it is critical to think of new ways to work together to drive innovation. This presentation will discuss how a pitch contest can drive innovation and ideas in the wastewater industry.

Speaker Bio

Pat Burke has been industry 15 years 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 was presented with a leadership award from the Heavy Contractor's Association. He is the CSAWWA chair of water distribution and is currently municipal Sales manager for VA/MD/DC

Friday, September 3rd, 10:00 AM
Benjamin Barker, YSI Inc, a Xylem brand
The role of online instrumentation in Enhanced Nutrient Removal (ENR)

Abstract

Municipalities within the Chesapeake Bay watershed have been working to achieve Enhanced Nutrient Removal (ENR) for over a decade, pushing nutrient discharge limits lower than ever before. Water resource recovery facilities (WRRFs) have utilized process control automation to optimize removal of nutrients and minimize inputs of energy and chemicals to accomplish this goal. Online instrumentation systems are the eyes into the wastewater treatment process, which gather data about the water at certain stages of the process. This data is used to automatically control processes to maintain wastewater variables at the optimal level with the intent to maximize treatment, while also being as efficient as possible. This abstract demonstrates how improved instrumentation technology is allowing operators to reach nutrient limits of 3 mg N/L and 0.3 mg P/L and describes how Seneca Wastewater Treatment Plant reached their reduced nitrogen limit. Online instrumentation is always improving. Sensors are becoming more reliable, easier to maintain, and more accurate at low levels. Specifically, instruments that measure nitrate and orthophosphate have improved greatly in the past decade, making Enhanced Nutrient Removal an achievable goal. UV-Nitrate technology is a step up from the ion-selective electrode technology, especially at low nitrate levels. In addition, UV-Nitrate sensor technology has improved with algorithms specifically designed for municipal wastewater and by scanning more wavelengths to compensate for the highly turbid wastewater environment. Orthophosphate analyzers have become easier to maintain, more reliable, and can measure lower than ever. The progress of these two technologies has made process control of nitrate and phosphorous removal to such low levels possible. The WSSC Seneca Wastewater Treatment Plant is one such example of this success. Seneca utilizes YSI UV-nitrate sensors in their 4-stage Bardenpho configuration to dose methanol in the anoxic zone. Originally, the idea was to use feed forward control of the dosing based off the nitrate reading at the upstream end of the anoxic zone. However, due to the slow reaction of the dosing system to peak loadings, the sensor was relocated to employ a feedback strategy. This new strategy involves locating the nitrate sensor at the downstream end of the anoxic basin and sending a feedback signal to control methanol dosing upstream. This new strategy works perfectly to maintain Total Nitrogen levels below their permit, averaging 1.98 mg N/L at their effluent. Not only are they meeting their new permit, but also using methanol as efficiently as possible. Accurate and reliable online measurements ensures the process is running optimally and confirms they are providing the best environment for their activated sludge process, making it possible for operators to achieve Enhanced Nutrient Removal.

Speaker Bio

Benjamin Barker has been with YSI for 4 years working with YSI's process instrumentation product lines. He has earned a B.S in Biology from The Ohio State University and a M.S. in Marine Biology from Nova Southeastern University. In his role as Applications Engineer, he develops technical writing material for the wastewater market, presents at trade shows across the US, assists YSI customers with sensor applications, and serves on the WEF Intelligent Water Technology Committee.

Friday, September 3rd, 10:00 AM
David Kerr, Barton & Loguidice DPC
Soup to Nuts: Evolution of Water Main Replacements to Complete Streets Projects

Abstract

The City of Annapolis recognized that their aging water (and sewer) infrastructure was in need of replacement. The City acted by developing an Asset Evaluation Plan to determine and prioritize assets for replacement. The City planned to begin implementation immediately. However, concurrently, Baltimore Gas and Electric (BGE) was actively replacing natural gas mains in many of the same streets in Annapolis. The City team in charge of repaving was already coordinating with BGE. Many of these same streets were in the plan for water main replacement as well and completing the work before repaving occurred would be optimal. The standalone water main replacement plan became the guide to coordinate a "Complete Streets" rehabilitation effort in the City. To complete the work the City retained multiple design/build teams to design and implement each project. This allowed faster implementation of the each project, but did have its challenges. This presentation will review some of the challenges, solutions, and lessons learned by the City during these projects.

Speaker Bio

David is the Practice Area Lead in the Mid-Atlantic Region for the water resources group of Barton & Loguidice. David has over 24 years of experience in the water and wastewater areas of practice focusing primarily on horizontal assets. His experience includes hydraulic modeling, asset management, master planning, design, and construction. David is registered professional engineer in Maryland and New York and a Board Certified Engineer for the American Academy of Environmental Engineers.

Friday, September 3rd, 10:00 AM
Caitlin Feehan, Alexandria Renew Enterprises
Educating Essential Workers Through Healthier Waterways: RiverRenew Training Modules

Abstract

Alexandria Renew Enterprises (AlexRenew) is the wastewater treatment provider for the City of Alexandria, Virginia and parts of Fairfax county. In response to a 2017 law, AlexRenew is implementing RiverRenew to improve the health and quality of Alexandria's waterways by July 1, 2025. RiverRenew is one of the largest infrastructure programs undertaken in Alexandria and includes the construction of a deep tunnel system and new sewer infrastructure coupled with upgrades to AlexRenew's Water Resource Recovery Facility. To keep AlexRenew's Operations and Maintenance (O&M) teams engaged through each phase of RiverRenew, a series of educational training modules were developed. The training curriculum was designed to follow the evolution of the Program and included topics such as sewer and regulatory history, project management, construction techniques, tunnel system operation, pumping stations, long term O&M, and commissioning. Each training was led by a RiverRenew subject-matter expert (SME) skilled in taking technical concepts and breaking them down into digestible, one-hour training sessions. Trainings began as in-person events but transitioned to Zoom meetings due to COVID-19. AlexRenew adapted by leveraging Zoom's interactive polls, chat, and recording features. Employees completed over 20 hours of training and gained a deeper understanding of RiverRenew, helping them fulfil AlexRenew's mission of improving the waterways that connect us.

Speaker Bio

Caitlin Feehan is a graduate of Northwestern University with a B.S. in Environmental Engineering and Yale University with an M.S. in Environmental Management. She is a professional engineer with more than 13 years of experience. Her notable projects include the DC Water Clean Rivers Green Infrastructure Program and AlexRenew's RiverRenew Tunnel System Program where she currently serves as the Program Director.

Friday, September 3rd, 10:00 AM
Yerman Saavedra, WSSC Water
Demonstration of Sidestream Enhanced Biological Phosphorus Removal at WSSC Water

Abstract

WSSC Water's Water Resource Recovery Facilities (WRRF) have stringent phosphorus limits and use a lot of aluminum sulfate (alum) to precipitate and remove phosphorus. Prior testing suggested that high alum concentrations in the solids may adversely affect anaerobic digestion (digestibility and biogas production). 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 Water is investigating ways that enhanced biological phosphorus removal (EBPR) can be implemented at all of WSSC Water's WRRFs. One innovative EBPR approach is to ferment a fraction of the Return Activated Sludge in a sidestream tank. The presentation will describe the findings from the 1-year full-scale pilot, which began in September 2020. The plant's performance will be highlighted including the alum use reduction and other benefits of the operational change. Challenges and lessons learned (e.g., high flows, elevated nitrate) will also be discussed. The next steps in WSSC's phosphorus evaluation will also be shared.

Speaker Bio

Yerman Saavedra is a Plant Superintendent at the WSSC Water Parkway Water Resource Recovery Facility. Prior to his current role, he spent a decade in two WSSC Water WRRFs as a Plant Engineer overseeing optimal treatment performance and proper operation of 19 pumping stations. His prior experiences were in the Petrochemical and Cement industries in Latin America, Yerman holds Master Degrees in Chemical Engineering and Hydric Resources from University of Los Andes in Venezuela.

Friday, September 3rd, 10:30 AM
Kartik Radhakrishnan, Black & Veatch
What Lurks Beneath: T-Lock lined Vault and Manholes Condition Assessment and Renewal

Abstract
Loudoun Water (LW) is a water and wastewater authority in the metro DC area that provides drinking water and wastewater services to over 80,000 households in Loudoun County. The majority of LW's system assets are relatively new due to recent rapid regional growth. The Elklick sewage pump station (SPS) conveys flow from LW's service area south of Route 50 in South Riding, VA through the Upper Broad Run Interceptor (UBRI). The UBRI consists of 30" & 36" pipes & 25 structures (force main receiving vault & 24 manholes) constructed in 1995 & lined with T-Lock PVC. T-Lock is a proprietary T-ribbed PVC lining material designed to protect concrete structures (pipes, manholes, vaults) from microbial induced corrosion of concrete, resulting from exposure to the sewer environment. Thiobacillus bacteria on exposed concrete surfaces metabolize the H2S gas in sewer environment into sulfuric acid corroding the concrete structure. T-Lock is cast into concrete structures and installed in sheets that are hot air welded together to create a welded seam between liner sheet sections. LW recently identified defects and potential failure of the T-Lock liners installed in the 25 vertical structures. T-Lock has been in the market since 1947 and is primarily installed in the western US. However, T-Lock is currently not being manufactured as of February 2020. Further, there is an absence of experience locally with the installation & inspection of T-Lock as compared to epoxy or polymer type coatings. The LW system has T-Lock installed in multiple facilities including newer infrastructure. Loudoun Water (LW) and Black & Veatch (BV) performed a condition assessment to include CCTV inspection of the entire interceptor as well as visual & sounding inspections of prioritized vertical structures through confined space entry. BV evaluated possible root cause of corrosion conditions by reviewing vapor phase H2S monitoring data at the upstream Elklick SPS, as well as atmospheric monitoring conducted during field inspections. Summary of findings included evidence of T-Lock liner detachment; deterioration of liner transition at exposed concrete surface; liner seam issues; corrosion of exposed concrete, vent structures, and manhole ring & covers; and hydraulic turbulence, especially at bends, contributing to corrosive conditions. Identified failures are the result of casting the T-lock liners in the field (instead of precast) on the existing concrete structures, compounded by improper workmanship. The failure of the T-lock liner to protect the concrete surface has resulted in concrete deterioration due to corrosion. Due to the criticality of UBRI flow conveyance, renewal of the identified 25 structures while keeping the wastewater interceptor in service is essential. BV evaluated & developed renewal alternatives analysis for repair/replacement/rehabilitation based on long term monitoring of assets, material resilience, construction/installation requirements, potential construction phasing & bypass considerations, impact to wastewater system operations, construction & life cycle costs and asset life extension estimates. In the presentation, LW and BV will share lessons learned regarding condition assessment of T-Lock lined assets, root cause of defects and potential failures, and renewal alternatives analysis based on constructability, O&M, cost and life extension estimates.

Speaker Bio
Kartik serves as an Engineering Manager for Black & Veatch and has over 10 years of experience & technical expertise in water/wastewater collection systems & treatment facility upgrades; linear infrastructure design & rehabilitation projects including condition assessment, pipeline & buried

infrastructure design, and trenchless technologies. He graduated with master's degree in civil & environmental engineering from Virginia Tech and is a registered professional engineer in the state of Maryland

Friday, September 3rd, 10:30 AM
John Fraser, Carollo Engineers
Concepts and Considerations for Flow Through Aerobic Granular Sludge Processes

Abstract
The Aerobic Granular Sludge (AGS) process is one of the most talked about emerging technologies for intensified nutrient reduction in the wastewater industry today. Through our Wastewater Innovation Leadership Initiative on Ballasted Activated Sludge, Carollo has performed joint testing of liquid/solids separation and granule selection with various process manufacturers. Currently AGS processes in Europe and the US are only offered in a Sequencing Batch Reactor (SBR) configuration. An SBR configuration significantly limits the application of AGS in the US. The results of our liquids/solids separation and granule selection testing pave the way for development of flow through AGS systems. This presentation reviews the results of AGS liquid solids separation testing and presents potential reactor configurations and operating considerations for flow through AGS.

Speaker Bio
John is the national Wastewater Practice Director for Carollo Engineers. Over 35 years of experience in planning and design of wastewater plants from 1 to 850 mgd. Focus on Robust, Easy to O&M, logically laid out, and innovative facilities. Leads Carollo's Ballasted Activated Sludge and AGS innovation leadership innitiatie.

Friday, September 3rd, 10:30 AM
Evan Andrews, Michael Baker International
Plan C: When CIPP Lining Fails Under I-95

Abstract

The Montgomery Road 12-inch Water Main Replacement Project in Howard County, MD, included a 475 LF crossing of Interstate 95. This crossing was to use an existing 12-inch main which was to be cured-in-place pipe (CIPP) lined. The crossing is located near a booster station and sees high operating pressures. The lining design called for a Class IV structural liner and incorporates the high operating pressure (153 psi) in the main. The lining system was installed but failed QC leakage testing. The initial response was to access the suspected location of the failure and repair the liner. When the repaired liner failed the leakage test, a new approach was considered. A flexible slipliner (Primus Line) was installed in the CIPP lined pipe which passed the leakage test and is now in operation. This presentation discusses the specification development and construction of the CIPP liner, attempted repair, and the successful sliplining.

Speaker Bio

Evan Andrews is a Project Manager with Michael Baker. He is a Professional Engineer with a Civil Engineering degree from Bucknell University. His 35 years of experience includes the planning, investigation and evaluation, design, permitting, and construction of water and wastewater infrastructure. This includes treatment, transmission, and distribution of potable water; and the collection, conveyance, pumping, and treatment of wastewater.

Friday, September 3rd, 10:30 AM
Kayla Yingst, Alexandria Renew Enterprises
Mentoring Youth in Underserved Communities Benefits both Students and Water Sector Workforce

Abstract

Forty percent of the water sector workforce will retire within the next few years. Water utilities will be challenged to fill these positions being vacated by retirees with qualified candidates and to retain their knowledge within the existing workforce. AlexRenew has created a number of strategic solutions to this problem, including formulating meaningful partnerships with high schools and internship programs in Northern Virginia. These programs are designed to encourage interns that have spent time working with us to help fill the water sector job pipeline and become our advocates within the community. To develop the program, AlexRenew partnered with Urban Alliance eight years ago. Urban Alliance works primarily with students from families in poverty and to provide paid internship opportunities to develop professional skills at a local organization. Each year one or two high-potential student interns rotate through various departments within our organization. The students gain firsthand experience of various jobs within the water sector. They learn the importance of each position and how it contributes to cleaning Alexandria's water. Departments that they work closely with include Finance, Administration, Communications, HR, Environmental Sustainability, Engineering, Operations, and Maintenance. Throughout the past four years as the Urban Alliance mentor for AlexRenew, Kayla Yingst has witnessed students gaining invaluable skills that allowed them to surpass their peers. Water Sector utilities that participate in programs similar to Urban Alliance not only provide benefits for the interns that they host but also for the water sector workforce! Collaborations like these offer hands-on skills valuable for the team member that takes on the mentor role. They also provide the youth of our emerging workforce the opportunity to learn more about careers in the water sector, which will help establish a steady flow to our workforce pipeline. The TriCon presentation will talk about the process that AlexRenew went through to select our community partner; how we've managed and grown this proven program; and the benefits of the program, both for AlexRenew, the students, and the local community.

Speaker Bio

Kayla Yingst is the Communications Programming Specialist at AlexRenew where she leads community event initiatives, internal communications, STEM activities, internship programs, and creates substantial relationships within the community. Kayla was honored as one of Alexandria's 40 Under 40 award recipients for her work in the community. She currently serves on the Juvenile Diabetes Research Foundation Young Leadership Board and is an active member of The Junior League of Northern Virginia

Friday, September 3rd, 10:30 AM
Chris Stanton, Xylem Inc.
Adaptive Mixing and Better Biological Nutrient Removal

Abstract

With the increased needed for biological nutrient removal (BNR) at wastewater treatment facilities, the needed for slow mixing has increased. In addition to needing mixers, operators are discovering that treatment results can be optimized by controlling the timing and speed at which they mix. The introduction of adaptive mixers has made this control not only possible but also programmable. This presentation will review the processes involved with biological nitrogen and phosphorus removal in wastewater. The role and needed for mixers will be reviewed with regard to each processes. The concept of adaptive mixing will then be introduced along with suggestions on what parameters to monitor within the treatment processes to make mixer speed automation possible. Parameters include monitoring and adjusting mixer speed based on tank levels, flows, DO levels, TSS concentrations and phosphorus release. Finally, the results from a study at Milwaukee Metropolitan Sewerage District will be presented. In this study, various mixer run times were evaluated to determine the optimal run/rest sequence for phosphorus removal. By studying the phosphorus release in the anoxic zone, it was determined that by not mixing 11.5 hours and running the mixers only 0.5 hrs per day in the anoxic basins, phosphorus removal was increased. Attendees of this presentation will walk away with a better understanding BNR and the role that mixing pays in its effectiveness. In addition they will learn different ways to monitor BNR processes and will have suggestion on control options that they can attempt at their own facilities.

Speaker Bio

Chris Stanton is an Environmental Engineer with Xylem's Flygt Mixer Group.

Friday, September 3rd, 11:00 AM
Michael Ariante, Mott MacDonald
It Still Runs! A Sewer Lift Station Condition Assessment

Abstract

The purpose of this presentation is to review the process and findings of an engineering study to determine whether to rehabilitate an existing sewer lift station and force main, or to consider replacement. The intent is to give viewers insights and share lessons learned during the process of the condition assessment study. The objective of the study was to determine the requirements for future capacity expansion of a sewer lift station, review the condition and capacity of the existing infrastructure, and identify improvements required to handle projected future flows. The study began with extensive inspection and testing of the lift station to determine which components required improvements and upgrades. The categories inspected included fire/safety, structural observations, pumping status, process and electrical equipment, and instrumentation and SCADA. During the inspection, fats, oils, and grease, or FOG, buildup in the wet well was found to be an issue. Several methods for FOG removal and mitigation were evaluated. In addition, the downstream gravity sewer main was inspected using CCTV and record drawings were reviewed to assess the condition of the pipe that the force main discharges in to. Pump drawdown tests were performed to confirm the capacity of the existing pumps and verify the operation of the pumps within expected conditions. The results of the test were used to update pump curves and compare them to the manufacturer's design curves. Hydraulic modeling was performed to evaluate the current capacity of the lift station and to determine the limiting capacity of the collection system. Alternative infrastructure including a new parallel force main and conversion of the gravity main to an extended force main were also evaluated with hydraulic modeling. Using this data and information, we evaluated alternative methods and provided recommendations to improvements and modifications of the existing lift station and sewer main. This presentation will review the process and findings of the pump station and sewer main inspection, pump drawdown tests, and capacity analysis modeling completed for the engineering study.

Speaker Bio

Mr. Michael Ariante is a project engineer for Mott MacDonald, with four years of experience. He has a broad engineering experience base with capabilities of providing support for water and wastewater design and consultancy services. His experience includes sophisticated studies and initiatives for water utilities, design improvements, and statistical analyses along with construction and preventative maintenance support.

Friday, September 3rd, 11:00 AM
Lee Tharps, Jacobs
Plant Analysis in an Era of Unpredictable Weather

Abstract

In 2018 the Chesapeake region experienced one of the wettest years on record, with annual rainfall nearly twice as high as the historical average year. 2018 saw an increase in both the number of storms but also an increase in magnitude and duration of storm events. Water resource recovery facilities have traditionally struggled during sustained peak flows – often manifesting as performance issues in primary clarification, aeration, and secondary clarification. Over the past two decades several approaches to managing peak flow scenarios have been utilized to improve treatment plant performance. In many of these cases, approaches have focused on addressing both direct and indirect symptoms of high flow. Often-times these issues are interpreted as capacity issues and addressed as such. However, in some cases it is beneficial to assess the performance of the plant comprehensively to identify potential lower cost strategies to mitigate process performance issues at high flows. At the Washington Suburban Sanitary Commission (WSSC) Piscataway Water Resource Recovery Facility (WRRF) the plant performance during 2018 was affected by persistent high flows. Influent flows increased nearly 30% year-over-year. This had a pronounced effect on treatment performance and presented several logistical challenges for maintenance and on-going construction activities. WSSC conducted a comprehensive evaluation of process performance as well as operations and maintenance (O&M) practices and evaluated several short and long-term improvements – both physical and operational – to mitigate the effect of high flows on plant performance and increase resiliency. This presentation will detail the evaluation approach utilized to identify opportunities to mitigate the impacts of high flow on the plant, improve plant performance, and enhance opportunities to perform key maintenance and repair activities. A review of the alternatives analysis of the identified improvements will be provided. Finally, a description of the selected improvements, and the implementation progress will be presented.

Speaker Bio

Mr. Tharps is a treatment process engineer with over 15 years of experience in the water/wastewater field. He has been involved in all aspects of the project lifecycle, from initial concept planning through commissioning of facilities for both municipal and industrial facilities. Mr. Tharps currently serves as the Regional Process Manager for Jacobs' O&M group where is he is responsible for process performance and innovation throughout the northern United States and Canada.

Friday, September 3rd, 11:00 AM
Scott Pendergrass, Mott MacDonald
Trust the Process – the Washington Suburban Sanitary Commission's Standardized Evaluation Process for Systemwide PCCP Replacement

Abstract
The Washington Suburban Sanitary Commission (WSSCWater) has begun a new infrastructure replacement program which replaces Prestressed Concrete Cylinder Pipe (PCCP) water transmission mains within its water distribution system due to age and deficiencies discovered in the original pipe material. The WSSCWater Planning Division, working with its consultant Mott MacDonald, has developed a standardized process in which alternative alignments are evaluated and ultimately selected for design. The evaluation process considers criteria such as easement acquisition, maintenance access, permitting and utility coordination, public and environmental impacts, construction cost, schedule and feasibility. The process also establishes the specific priorities for a given project through stakeholder input, pairwise comparison and quantitative and qualitative analysis. The decision-making for the process is supported by the collection of a limited set of field data (survey, utility identification and borings) at strategic locations. The goal of the standardized process is to provide a versatile framework for alternative evaluation for all future PCCP water transmission main replacement projects systemwide. The selected alignments, once fully vetted with preliminary design packages complete, are submitted to the Pipeline Design Division for final design and permit acquisition. The key elements of this process will be jointly presented by the WSSCWater Planning Division and Mott MacDonald, focusing on the development of the standardized process and its implementation on the Hill Road Water Transmission Main Replacement planning and preliminary design, consisting of the replacement of approximately 1.8 miles of 30-inch PCCP with 42-inch DIP transmission main in suburban Prince George's County. There will also be a focus on lessons learned during implementation of the standardized design process.

Speaker Bio
Scott Pendergrass is a Professional Engineer who has been working with Mott MacDonald in the field of water resources for the past 13 years. He has an undergraduate degree from the University of Delaware and a Master's degree from Rutgers University. Mr. Pendergrass's main focuses are in the area of water treatment, storage, transmission and distribution.

Friday, September 3rd, 11:00 AM
Jeannette Laramee, Stantec
Development of an automatic dispenser to supply water in the Ger Area of Ulaanbaatar, Mongolia

Abstract
The Millennium Challenge Corporation (MCC) entered a Compact with the Mongolian Government in 2018 with the overall goal of increasing bulk water supply in the capitol city of Ulaanbaatar City to meet its growing demand. Among the various projects under development is the installation of automatic dispensers at water kiosks in the Ger Area – a peri-urban and lower-income area of Ulaanbaatar where 800,000 people (55% of the city's population) currently reside, to improve the financial sustainability of supplying water, as well as improve water access in this community. Currently, the Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) incurs the highest cost per volume for water supply to the Ger Area resulting in overall annual operating losses for the utility. Water is supplied to roughly 640 kiosks in the Ger area through a combination of pipe-fed and truck-fed kiosks. This infrastructure mirrors -with a geographic twist!- the situation in many developing major cities where water demand is high but piped water supplies have yet to become practical and affordable. At most of the kiosks in Ulaanbataar, an operator is required to sell water to customers, resulting in high personnel costs for the utility to cover, as well as limited operational hours for customers. Over the last few years, USUG has embarked on a program to convert kiosks to "smart water kiosks" by installing automatic water dispensers in each kiosk which allow customers to buy water 24hours per day using a smart water card, thus eliminating need for an operator, lowering operational costs and improving customer access to water. Stantec, as technical advisor to MCC, is now supporting USUG and the Millennium Challenge Account of Mongolia (MCA-Mongolia) to develop a more robust dispenser design and to roll-out conversion of pipe-fed kiosks to smart water kiosks early in the 5-year Compact period. This presentation will discuss USUG's experience and lessons-learned with smart water dispensers over the last few years as well as the advantages and disadvantages of off-the-shelf and custom-built water dispensers. We will also discuss the challenges of designing a dispenser that can withstand the extreme cold weather in Ulaanbaatar (up to -30C during winter months) and erratic power supply, the process of developing a custom-built dispenser, along with the key hardware components, data collection software, and mobile app options. The approaches for procurement of this diffuse infrastructure at more than a hundred sites will be discussed. The presentation will also provide a detailed analysis of capital and operational costs including the extent to which installation of the automatic water dispensers are projected to allow USUG to reduce the cost of water delivery to the Ger Area.

Speaker Bio
Jeannette is a Civil Engineer with 15 years of infrastructure development experience in sub-Saharan Africa, Asia and North America. Her project experience as a consulting engineer and researcher spans all phases of infrastructure development including feasibility studies, detailed design, construction oversight, commissioning, monitoring and evaluation. Jeannette holds a PhD in Civil and Environmental Engineering from Stanford University.

Friday, September 3rd, 11:00 AM
John Dyson, Aqua-Aerobic Systems, Inc.
Enhanced Domestic Primary Wastewater Treatment Utilizing Pile Cloth Media Filtration for Operational Savings and Sustainability

Abstract

For the last 10 to 15 years, the wastewater industry has been moving towards being more energy efficient and self-sustaining. Our wastewater resource recovery facilities are capable of self-sustaining because we can convert the solids into usable materials for energy production. There are many ways to make a facility self-sustaining and new technologies make this possible. Presently, the largest consumption of energy is our secondary treatment process. One way to reduce energy consumption in the secondary treatment process is to reduce the organic load. This is known as carbon diversion. Historically, this has been done primary clarification or processes which require chemical addition to increase the removal of solids and the related organic loading. After extensive use of pile cloth media filtration (PCMF) in tertiary applications for over two decades, pile cloth media filtration has now been adapted for primary domestic wastewater treatment. The use of the PCMF's physical barrier means chemical addition is not required while achieving high removal of organic material. The improved effluent quality reduces TSS and BOD loading to the secondary process resulting in reduced aeration costs and more capacity within the existing secondary treatment process or a smaller system. Additionally, the waste stream from the filtration process can be directed to thickeners, then to anaerobic digesters for increased gas production. The PCMF technology has been extensive tested and there are now full-scale operating installations. The paper will cover testing that has been conducted at over dozen locations and the two full-scale operating installations. The testing includes the following: Influent and Effluent TSS, VSS, BOD, O&G, etc. Unit Loadings, Backwash Frequency, Operation Parameter, etc. Backwash and Solids Waste Characteristics, etc. These studies have documented the technology's capabilities to achieve TSS and BOD5 removals of >80% and >50%, respectively, versus primary clarification which typically achieves about 45 to 65% TSS and 25 to 35% BOD5 removal. This increased TSS and BOD5 removal indicate the potential for this new primary filtration system to reduce energy demands in secondary treatment processes and increase gas production in digestion systems. The paper will cover the energy savings and biogas production with the use of PCMF and how this moves a WRRF closer to being self-sustaining. PCMF has been selected for full-scale implementation at several locations and will be covered in the paper. At Oak Hill, WV, a PCMF system is operating now for increasing plant capacity plant due to the footprint constraints at the treatment facility. In Linda County, California, PCMF has been studied extensively for the energy savings for almost 3 year now. PCMF is a new solution that has emerged as a promising technology due to its proven performance and operational advantages compared to existing treatment processes. The improved effluent quality from primary treatment step reduces TSS and BOD loading to the secondary process, providing more capacity within the existing secondary treatment process or energy savings. The waste stream from the pile cloth media filtration process can be directed to thickeners, then to anaerobic digesters for increased biogas production.

Speaker Bio

John holds a B.S. degree in Chemistry from Longwood College. He has experience working with many treatment technologies including clarifiers, filters, disinfection, biological and membrane processes in

both the water and wastewater segments of the industry. Over the 25+ years, worked on many projects varying in size from 0.1 MGD to 600+ MGD with multiple technologies. John experience with the many technologies gives him a unique ability to evaluate and determine the best solutions for clients.