2018 Tri-Association Conference

Technical Program Summary

August 28 – 31, 2018 Ocean City, Maryland

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8/29/2018, Room 201, 8:30:00 AM to 9:00:00 AM,

Presenter: Aditya Ramamurthy, Hazen and Sawyer, aramamurthy@hazenandsawyer.com

Title: Integrated Information Management - Data Driven Road Map for Enterprise Decision Making

Abstract: Simple data analytics reveal basic insights; more sophisticated analytics, applied to data that has been pooled into a "data lake" with data from external and enterprise sources allows utilities to unearth deeper insights that will help to optimize performance. Because of the growing volume, complexity and strategic importance of asset management data, it is no longer desirable or even feasible for each department/ unit/division/function within a utility to manage this data by itself, or to build its own data analytics capabilities. To get the most out of the new data resources, utilities are creating dedicated data groups that are potentially embedded within the core asset management program team to consolidate data collection, aggregation and analytics. Three trends have emerged in the data management realm - cloud computing, mobile computing, and explosion of data. Utilities are collecting more data than ever before. However, the challenge facing utilities is their inability to convert all the data into meaningful & usable information. Over the past year, self-service business intelligence tools have provided the necessary capabilities for utility staff to process and analyze data to produce meaningful insights. Advances in technology have revolutionized data and performance reporting so that users (with limited IT development expertise) can perform data mining and develop high impact visuals for performance reporting. Water and Wastewater Utilities are implementing Business Intelligence (BI) frameworks to track and report key asset management performance indicators and other data analytics. Benefits of this business intelligence reporting framework include: 1.Eliminates the reliance on core IT developers to develop and manage reporting frameworks as BI is now integrated with common applications, putting the non-IT user in a position to perform complex data analysis and develop aesthetically-pleasing visualizations 2. Significantly reduces development cost and level of effort 3. Through the concept of data "lakes", data models can be constructed using data from various sources (CMMS, GIS, SCADA, project management, financial and customer information systems) with ease 4. Eliminates the extensive costs and need for complex and disparate system integration that is typically required to connect data for effective performance reporting 5. Reduces the time to develop high impact visualizations to hours or days, rather than weeks, months, and years 6. Complete transferability to mobile devices for use at meetings and workshops This presentation will discuss the utility management business intelligence frameworks (2 case studies) that have been implemented by utilities for effective integration, tracking and reporting of various data within their organization. The main purpose of this paper is to discuss the value generated by two utilities implementing business intelligence through data analytics, its ease of use by business users (management through project engineers), and how business intelligence can help utilities align with the 3 current data trends (cloud, mobile, and explosion of data)

8/29/2018, Room 201, 9:00:00 AM to 9:30:00 AM,

Presenter: David Gisborn, DC Water, david.gisborn@dcwater.com

Title: The Journey to World Class Maintenance – Lessons Learned From Implementing a Reliability Centered Maintenance Program

Abstract: The buzzwords “world class” are increasingly used in today’s industry, both as a bold, boasting statement of what we are, and as a mythical mountaintop of where we are trying to be. The reality for most of us is that it is motivational terminology of what we are trying to achieve. Today’s presentation will focus on Reliability Centered Maintenance (RCM) and how DC Water has adopted the methodology to overhaul its approach to maintenance at Water, Sewer, and Stormwater Pumping Stations. The fundamentals of RCM were developed in the 1970s by revolutionary thinkers at United Airlines, and some of the early adopters included the U.S. Navy for its nuclear-powered attack submarines, and the Nuclear Regulatory Commission (NRC) in the wake of the Three Mile Island (TMI-II) meltdown. RCM has a simple concept – reduce the life cycle cost of an asset and improve its reliability – and this is done by a detailed look at functions, functional failures, failure modes, and consequences, and then designing the most effective maintenance task to prevent, mitigate, or find the proposed failure. DC Water began its RCM journey in the summer of 2017, and we will look at the process - from system selection to implementation and beyond - examine some of the results, and discuss in detail the success stories, the challenges, and some of the out of the box thinking that has developed from the task. As of November 2017, the pilot study on two systems recommended modifying over 90% of the maintenance program in each system.

8/29/2018, Room 201, 9:30:00 AM to 10:00:00 AM,

Presenter: Charlie Card, GHD, Inc., charles.card@ghd.com

Title: Taking Risk to the Next Level: Capital Region Water's Risk-Based Approach to Prioritizing Consent Decree Work

Abstract: In December 2014, Capital Region Water entered into a partial Consent Decree with the United States Environmental Protection Agency (EPA) and the Commonwealth of Pennsylvania Department of Environmental Protection (DEP). This partial Consent Decree required Capital Region Water to develop a plan to reduce runoff pollution entering Paxton Creek and the Susquehanna River, undertake improved operation and controls of the system, and implement early action projects to become compliant with the Federal Clean Water Act and the PA Clean Streams Law. In order to optimize the use of scarce resources, accurate prioritization of consent decree related work was essential. This presentation will focus on CRW's unique risk-based Asset Management approach to identifying and prioritizing replacement, rehabilitation, and Operations & Maintenance activities for its buried wastewater and stormwater assets. CRW's methodology builds on the basic risk equation of Probability of Failure (POF) X Consequence of Failure (COF) = Risk, but expands on it using the concepts of dominant COF and triple bottom line (TBL) COF. Asset probability of failure is determined as a function of remaining service life and is correlated to the asset's physical condition and other performance considerations (capacity, O&M, regulatory). Asset consequence of failure is evaluated based on estimating the environmental/regulatory, financial and social impacts of a defined failure of the asset. Assets are assigned elemental COF scores for each of seven elements under the three TBL categories. The highest individual score across these elements for each asset is referred to as the dominant COF score. When multiplied by the asset's probability of failure (POF) rating, dominant COF is used to calculate the Core Risk posed by an asset. An asset's core risk score establishes its initial prioritization and risk management strategy (a.k.a. risk management zone). The risk management zone establishes the initial prioritization consideration (prioritization bucket) for asset operations & maintenance (O&M) and capital investment needs. Additional prioritization of asset interventions within individual risk management zones is accomplished via a full Business Risk Exposure (BRE) analysis. In contrast to the calculation of dominant COF, which considers only the highest score, summation of the highest individual scores within each TBL category results in the TBL COF score. When multiplied by the POF rating and available mitigation, it is used to calculate the overall BRE Score. Once assets have been assigned a priority zone using Core Risk, BRE scores are used to further prioritize assets within each zone and assign the appropriate management strategy (repair, rehab, replace or condition monitoring). The presentation will present and discuss CRW's scoring methodology and results for prioritizing assets for targeted renewal, rehabilitation, and inspection investment with available funding levels to meet the requirement of the consent decree.

8/29/2018, Room 201, 1:00:00 PM to 1:30:00 PM,

Presenter: Robert Hindt, Little Patuxent WRF, rhindt@howardcountymd.gov

Title: No More "The Way We've Always Done It" - Start-up, Commissioning and Operator Training Begins on Day One

Abstract: Why do we collectively (as in the whole wastewater "industry") continue approaching major treatment plant upgrades as if they were a relay race? Owners begin the race and hire a designer. The designers pick up the baton, working to meet the owner's goals. The construction firm picks up the baton and works to complete construction within the project window. As construction wraps up, operations and maintenance training occurs just before equipment turnover. The O&M staff is handed the baton and becomes fully responsible to operate and maintain the new systems and processes. The designers and the contractors move on to the next race. Sound familiar? Howard County management at the Little Patuxent Water Reclamation Plant (LPWRP) decided that there are opportunities to execute a better upgrade project. They committed to build upon the successful CMAR approach used for the previous upgrade project. This new project, Biosolids Processing Facilities Improvements includes some new goals: Involve the O&M staff in the project from the beginning, Approach training as a more holistic adult learning process, and Ensure that the Plant O&M staff are prepared to take ownership and feel confident about taking responsibility for the new equipment and processes. This presentation focuses on how the team, made up of the County's management, the designer (HDR), the construction manager at risk (CMAR- Clark Construction) and the LPWRP O&M staff, have worked together to support a smoother, more efficient transition to final ownership by the LPWRP staff. New approaches were taken in several key areas to move towards the new goals. After 30% Design, the CMAR was brought on-board including someone specifically tasked with commissioning and training from Day 1 - Passaro Engineering. Solicit and use meaningful O&M staff input. At 30% Design, the entire O&M staff was introduced to the design through a series of presentations and a workshop led by HDR. This training enabled O&M staff to contribute when input can still be effectively included. O&M focus teams were created for each major sub-process to allow more in-depth participation in design and construction. They dove deep into the details to give meaningful design input and to create ownership from the early stages of the project. Input was solicited on topics uniquely understood by a specific group: maintenance staff discussed their needs to maintain the equipment, operators provided input on HMI screens. O&M focus teams defined alarm priority levels and assigned the level for each alarm. Plant staff were involved in making sure that equipment descriptions use consistent terminology that was familiar to them and created tag names that were meaningful. Keeping manufacturer training focused on O&M parameters and project specific information, not design considerations or equipment options and is constantly tied back to the overall process and application at LPWRP. Collect and organize O&M information so that it is most useful to the end users including a format that allows for quick searches. Manufacturers are required to summarize key information so that it can be efficiently entered into the computerized maintenance management system.

8/29/2018, Room 201, 1:30:00 PM to 2:00:00 PM,

Presenter: Essey Woldemariam, DC Water, essey.woldemariam@dcwater.com

Title: Making Sure Your 'Smart Water System' Is Truly Smart. Roadmap Your Success

Abstract: To achieve strategic goals of optimally managing infrastructure and enhancing operating excellence, DC Water is transforming its water distribution and wastewater collection system into a “Smart Water System”. This transformation will be done by adding remote water quality, pressure, and level sensors at key locations throughout resulting in an enormous amount of new operational data. Coupling these sensors, data collected, and required analytics and operator friendly information dashboards will take time. The water system sensor program (WSSP) roadmap is intended to guide that process. Stretch goals developed by information gathered during the Partnership for Safe Water program, DC Water’s “Blue Horizon 2020” operational manifesto, and other operational desired outcomes include the following: Water Quality complaints reduced - Reduce taste and odor issues and corresponding customer complaints by installing 2 – 4 water quality stations in the 8 pressure zones. Combined with a fully calibrated hydraulic model, this information will help to pinpoint areas needing increased flushing, or systematic water age reduction through pumping and tank cycling. Water Main Breaks reduced to 20/100 miles – Breaks will be reduced by minimizing transients created by pump surges, improper valve closures, and large customer demand. As many as 12 additional pressure monitors will monitor minimum, maximum, and surge pressures. Surges will be addressed with improved pump control valves, PRVs in system, and SOPs that will set a standard for valve closing. Pipe leakage reduction – District Metering will be applied to perform mas balance assessments with newly installed meters and enhanced Advanced Metering Infrastructure (AMI) will be used to help locate and reduce non-revenue water in the distribution system. Basement backup and CSO reductions - Level sensors will be added to help to monitor trends in the collections system and pinpoint cleaning efforts and new capital projects to help reduce surcharging in the system. To achieve these goals, there are numerous items that will need to be tackled in the process. These challenges are identified in the roadmap and are integral to a successful program. They include: Data delivery – Delivery includes radio, cellular, satellite, mesh networks, and ‘low power wide area network”. Each have their benefits and costs implications which are under considerations. Ultimately, field data will be delivered to DC Water’s cloud server where it can be accessed by all. Data management – in addition to the newly collected data, DC Water has a robust SCADA system that will be incorporated with the remote sensor data into coherent information ‘dashboards’. It will be necessary to develop these dashboards to quickly provided the agreed upon operator information Monthly reporting – Automatic reporting will be developed to augment the efforts associated with pipe break analysis, water quality monitoring reporting, sewage maintenance requirements, and . Operational Changes – While the increased data can provide insight, understanding what should be done to address the unwanted outliers is required. This may include increased flushing, spilling to lower zones, pump operations, and additional sewer cleaning. Capital Investments – operational changes may require capital improvements.

8/29/2018, Room 201, 2:00:00 PM to 2:30:00 PM,

Presenter: Ogechi Okpechi, DC Water, ogechi.okpechi@dcwater.com

Title: Change Happens and Sometimes It’s Good - Performance History and Lessons Learned from 17 Years of Construction Projects

Abstract: The objective of this paper is to present data to understand the causes and costs of changes during construction on past projects, and present proposed program changes to improve management (design and construction) and performance of construction projects. DC Water has collected data on numerous projects spanning a period of more than 17 years. The types of projects include treatment process upgrades and expansions, electrical improvements, instrumentation improvements, basins, pumping facilities, buildings, and site infrastructure. Construction costs ranged from $1M to $100M. Data from these projects was collected and analyzed to include initial contract amounts vs. final construction cost. Changes during construction were categorized into the following types of changes: engineer’s errors and omissions (E&O), changes in scope/owner requested changes, differing site conditions/unforeseen conditions, and administrative and other costs. Changes were further broken down by trade or discipline, including Civil/site, Structural, Mechanical Process, HVAC, Electrical, and Instrumentation & Control. Observations from the data include: 1) Changes due to engineers’ errors and omissions were relatively consistent in the range of 2 to 5% of construction cost, 2) the largest percentage of changes came from scope changes, 3) differing site conditions were around 1.3% of construction cost, 4) electrical and instrumentation changes were the largest category by discipline or trade. Conclusions and lessons learned will be categorized into 3 major groups: changes that can be controlled, changes that are unavoidable and changes that are good. There will always be errors and omissions, differing site conditions, and additional customer needs, therefore zero change is not attainable. The challenge is how much money and resources should be dedicated to managing change.That is, investment in the planning and anticipation of change can be used to set appropriate allowances for changes during construction and budget accordingly.

8/29/2018, Room 201, 3:30:00 PM to 4:00:00 PM,

Presenter: John Helwig, GHD, Inc., john.helwig@ghd.com

Title: CMMS / EAM Systems – Are you Actually Ready?

Abstract: Computerized Maintenance Management (CMMS) and Enterprise Asset Management (EAM) systems present an opportunity for utilities to vastly improve their operations and service levels while reducing equipment lifecycle costs through better planning, scheduling, executing of work. CMMS and EAM systems also provide the often overlooked benefit of linking your utility's day-to-day operations with its strategic asset management objectives, such as improved line of sight between senior management and operations and maintenance staff, in addition to improved customer service levels from improved asset reliability. This presentation will first discuss the strategic and tactical work that should be undertaken prior to pursuing any CMMS / EAM system implementation, an opportunity, when overlooked, can actually threaten the success of implementation. In that vein, the following concepts will be explained: 1) how leading and lagging performance measures can improve the line of sight between the more tactical objectives of maintenance and engineering with the more strategic objectives of senior management, 2) which of The Five Questions of Asset Management to focus on first, 3) recommended organizational changes, including the vital role of the planner / scheduler, 4) the IPSECA (Identify, Plan, Schedule, Execute, Close-out, and analyze) process for work management and 5) how the Five Questions link to IPSECA. Additional emphasis will be placed on how business process mapping, the asset register, and job task analysis present some of the best "bang for the buck" opportunities to improve your utility's readiness. This presentation will conclude with a review of best practices for a successful CMMS/EAM procurement, including development of software functional requirements, upgrades to ancillary hardware and software (including GIS), request for proposal (RFP) development, vendor shortlisting, and vendor selection and procurement.

8/29/2018, Room 201, 4:00:00 PM to 4:30:00 PM,

Presenter: Patrick OBrien, DC Water, patrick.obrien@dcwater.com

Title: Public Private Partnerships and Capital Project Backlogs

Abstract: Capital infrastructure projects for utilities are always prioritized based on a combination of needs, risks and available funding. The ability to improve delivery timelines for lower risk but high customer support outcome projects can be improved if mechanisms can be put in place to allow private entities opportunities to fund and profit from participating in infrastructure projects. The balance in generating additional capital funding with a revenue stream is the subject of this presentation on bringing private entities to the utility capital project market.

8/29/2018, Room 201, 4:30:00 PM to 5:00:00 PM,

Presenter: Margie Hamner, CPLP, ACC, Starfish Consulting, LLC, margie@starfishconsulting.net

Title: Succession Planning: It's Easier Than You Think

Abstract: It's no secret that water and wastewater utilities need a comprehensive Succession Plan to ensure business operations continue seamlessly after key employees leave or retire. After all, our business provides a vital resource and responsibility to the public. We've all heard that baby boomers are going to retire in droves and that we better get ready. We've also heard that the "younger generation" may quit at a blink of an eye for upward mobility. Yet succession planning is often one of those low priority tasks that gets put on the back burner or never gets accomplished. Why? Because the task of developing a formal succession planning program often seems too big to tackle and many utility managers simply don't know where to begin. Or Human Resources is looked upon to develop the succession plan, often in a vacuum. Regardless of who takes the lead, identifying and documenting critical positions and processes, cross training, mentoring and creating a future leader program are good places to start. This interactive and practical presentation will define and outline the key components of a succession plan and identify easy steps that can be taken right away, regardless of your position within the utility. Participants will receive a Succession Plan Worksheet to help prioritize which succession planning components are most important, determine who needs be involved and what specific action steps can be taken towards developing your own succession plan.

8/29/2018, Room 202, 8:30:00 AM to 9:00:00 AM,

Presenter: Steven Anderson, KCI Technologies, Inc., steven.anderson@kci.com

Title: City of Baltimore Back River WWTP Activated Sludge Plant-4 Aeration System Design Considerations

Abstract: KCI was selected by the City of Baltimore to provide the design for Activated Sludge Plant-4 addition. The plant was designed for to provide a 69 MGD ADF / 169 Peak Hour MGD expansion to supplement the winter nitrification process. The plant expansion also provides additional capacity to allow the City to perform large scale maintenance within the parallel treatment systems (Plants-2 & 3), while maintaining permitted treatment capacity. The Plant-4 addition includes 6-Reactors and 12-Secondary Clarifiers to achieve permitted treatment levels of BOD5-126 mg/L, TSS-85 mg/L, TKN-31 mg/L, NH3-N-18 mg/L, and a TP-3 mg/L. The reactor design includes 12-zones, 2-Anoxic, 2-Swing, and 8-Oxic to provide biological denitrification followed by complete nitrification. The swing zones utilize variable speed Invent mixers with purging rings for enhanced aeration, followed by 6-zones of fine bubble diffusers and 2-(low DO) finishing zones with a combination of fine bubble aeration and Invent mixers with purging rings. The 8-Oxic zones employ DO analyzers, air flow meters and modulating aperture air control valves. The aeration system is designed around APG Neuros turbo blower technology and control system to provide efficient economical aeration across 6-Reactors for complete nitrification. The blower system was designed to furnish primary blower air to Plant-4, and supplemental blower air to Plant-3 during maintenance outages. The Plant-4 blower air system consists of 8-blowers (Train-1) with 2-blowers required for standby service. An additional 4-blowers have been provided for Plant-3 supplemental air services and high demand requirements at Plant-4, therefore an additional 6-blowers are provided for standby and supplemental aeration services (Train-2). The turbo blower technology utilized is an air-foil bearing design which is expected to provide an approximate 30% energy cost savings when compared to a traditional centrifugal blower and control system. Each blower is designed to provide 5,700 SCFM for a total system air flow design of 57,000 SCFM capacity to Plant-4. Each blower utilizes a 350 HP high speed turbo core turning at 30,000 RPM. The blowers utilize integral VFDs and controllers designed for staged and sequenced starting and shutdown operations unique to the turbo blower technology. The blower facility was designed with overhead blower air piping and distribution headers to Plants-3 & 4. The blower air piping system was designed for thermal expansion isolation from the building structure, while independently supported for controlled expansion, surge and relief conditions. The blower master control system (MCS) employs an Ethernet network connecting all 14-blowers for unified system control. The MCS also utilizes a Profibus reactor network to provide individual reactor zone DO PID loop control. The MCS network provides totalized real-time blower air requirements to control the online blower air supply. The control system can be setup for pressure control, DO control, or a combination of DO and operator control set-points. The MCS is also connected to the plant DPCS for operator over-rides and system notifications.

8/29/2018, Room 202, 9:00:00 AM to 9:30:00 AM,

Presenter: Ladan Holakoo, GHD, Inc., Ladan.Holakoo@GHD.com

Title: Understanding Aeration Demand Challenges of Resort Area Wastewater Treatment Facilities

Abstract: The South Coastal Regional Wastewater Facility (SCRWF) serves a popular beach resort community in Delaware and is planned to be expanded to 10 mgd maximum month flow. Due to the seasonal nature of the area related to beach tourism, wastewater flows and loads vary significantly between the summer and winter months. The plant has historically suffered from aeration deficiency during the peak season despite having sufficient theoretical aeration capacity. Analysis of the historical data suggests that for resort-area facilities such as this, the aeration demand is highly driven by peak weekend demand, when flows and loads can be significantly higher than the maximum month summer. An activated sludge model was made in BioWin and a set of supplemental sampling and simultaneous blower operating data were collected over the July 4 weekend in 2017 to calibrate the aeration model and refine the design aeration parameters. Supplemental sampling and simultaneous blower operating data were used to estimate the α factor by fitting the collected data into the aeration model. Analysis of the data suggests that the average alpha during the peak summer is 0.44. A correlation between the oxygen uptake rate (OUR) and alpha factor was developed and OURs derived from the BioWin model was used to estimate the design alpha in each zone. A cascade aeration approach was also used to refine the tapered aeration design by transferring the surplus AORs that may not be met in the previous zone over to the next zone. This approach should help prevent the oxygen deficiency carry over and help the system catch up with the DO set points during the peak loads. The resulting model was used to design the aeration system for the facility upgrade.

8/29/2018, Room 202, 9:30:00 AM to 10:00:00 AM,

Presenter: Taha Mohammed, CDM Smith, mohammedta@cdmsmith.com

Title: Hurricane Hardened Emergency Power Systems - Does your Facility electrical system meets the industry reliability requirements

Abstract: Power interruptions in the water and wastewater industry will cause loss of production revenue and potential impacts to the public and the environment. A reliable electrical system will avoid these potential risks and maintain operations for nominal additional cost. The U.S. Environmental Protection Agency (USEPA) and Virginia Department of Environmental Quality Sewage Collection and Treatment Regulations (SCAT) govern the requirements of electrical systems based on the reliability classification of the facility. This presentation will provide a broad overview of USEPA, Ten State Standards, and Virginia SCAT requirements for electrical systems at water and wastewater facilities, based on the reliability classification of the facility, and a refined focus on the design of emergency power systems for facilities in relation to hurricane hardening. The presentation will cover design and hardening considerations for all aspects of emergency power systems design, including types of generators, outdoor enclosures vs. indoor installations, cooling requirements, fuel systems, noise considerations, maintenance, and aesthetics. The presentation will conclude with a case study of two generator installations in Florida – located within five miles of each other – and how each facility performed during the summer of 2004 when this particular area of Florida was impacted by three major hurricanes over a seven-week period. One facility was designed in the early 1990s and did not incorporate hurricane hardening elements, while the second facility, designed in the late 1990s (after Hurricane Andrew), incorporated several hurricane hardening elements. The difference in performance between the two facilities was extraordinary.

8/29/2018, Room 202, 1:00:00 PM to 1:30:00 PM,

Presenter: Thor Young, GHD, Inc., thor.young@ghd.com

Title: Challenges of Nutrient Removal Permit Compliance During ENR Upgrade Construction and Startup

Abstract: Meeting stringent effluent permit limits for nitrogen and phosphorus is always challenging, but particularly during construction of a major facility upgrade project with significant impacts on the secondary treatment tankage, equipment, electrical, and control systems. This presentation will present a case study of the Enhanced Nutrient Removal (ENR) Upgrade of the 15 mgd Cox Creek WRF. New NPDES permit limits for total nitrogen (TN) and total phosphorus (TP) took effect midway through the five year construction project to convert the facility from conventional MLE activated sludge to a 4-stage membrane bioreactor (MBR). These limits forced engineering and plant operations staff to devise ways to optimize plant performance with temporary systems to attempt to meet the new permit limits despite the new facilities not yet being completed. Operating a facility under construction to meet a stringent new permit before the new treatment and controls systems are finished is a monumental challenge, but operators at the Cox Creek WRF were able to show significant improvements over time in effluent TN and TP performance though temporary systems and experimenting with different operational setpoints. This paper details operations adjustments during the course of construction, reviews the results, and offers lessons learned for future projects.

8/29/2018, Room 202, 1:30:00 PM to 2:00:00 PM,

Presenter: Peter Schuler, Brown and Caldwell, pschuler@brwncald.com

Title: Startup and Operation of New 4-Stage Bardenpho at the Salisbury WWTP

Abstract: The objective of this project was to convert the Salisbury Wastewater Treatment Plant (WWTP) from an attached growth to suspended growth activated sludge system to achieve Enhanced Nutrient Removal (ENR) limits for Total Nitrogen (TN) of <4 mg/L and Total Phosphorus (TP) of <0.3 mg/L as part of the Chesapeake Bay Nutrient Reduction effort. Although the contractor is currently still working on upgrades to other unit processes at the 8.5 MGD WWTP, enough of the new 4-stage Bardenpho process was complete to allow startup to commence in mid-October 2017 by hauling in 120 truckloads of mixed liquor from the Cambridge WWTP over the course of 3 weeks. The new process was achieving the ENR limits for TN and TP in early December 2017. This presentation focuses on the startup of the new 4-stage Bardenpho process as well as the performance optimization efforts we have undertaken since startup to optimize plant performance and reduce chemical costs. The presentation will include lessons learned during the startup and operation of this new unit process for the City. In addition, a comparison will be provided between the effluent parameters and operational costs predicted during the original process design and observed during the full-scale operation. It should be noted that currently the facility is treating about 5 MGD and producing an effluent with the following parameters: TSS / BOD = < 5 mg/L, Total Nitrogen = <3 mg/L and Total Phosphorus = 0.2 mg/L with only half of the aeration basins in operation.

8/29/2018, Room 202, 2:00:00 PM to 2:30:00 PM,

Presenter: Per Struck, Whitman, Requardt & Associates, LLP, pstruck@wrallp.com

Title: Improving the Health of the Bay: The City of Baltimore Implements Enhanced Treatment Facilities at their Largest Wastewater Treatment Plant.

Abstract: The City of Baltimore has recently implemented the first phase of the Enhanced Nutrient Removal facilities at the 180 MGD Back River WWTP, the culmination of an ENR program that began around 2006 with initial engineering studies, followed by preliminary and final designs, and into construction. Phase I focused on enhanced nitrate removal by post-denitrification of the effluent from the existing BNR plants, while Phase II will provide more reliable year-round nitrification through the addition of activated sludge facilities. The Phase I Denitrification (DN) Facilities which include biological deep-bed DN Filters, among the largest of its kind in the world with a total of 52 filter cells and each one hundred feet long, were commissioned in July 2017. Since, the plant has consistently achieved ENR quality effluent reducing the discharge of nitrogen by nearly two million pounds per year. Phase I also includes: chemical facilities (methanol, ferric chloride and phosphoric acid); filter backwash treatment; flow diversion/distribution; plant pumping station; and improvements to the existing activated sludge facilities that includes upgrade with the new state-of the-art hyperbolic mixers and mixer/aerators in conjunction with airflow control valves and airflow meters, and addition of surface wasting pumping stations for foam control. This presentation will include a brief project background and overview, a summary of the facilities for Phase I and II, some of the challenges during commissioning and startup of the new Phase I facilities, and a discussion of the process performance to date.

8/29/2018, Room 202, 3:30:00 PM to 4:00:00 PM,

Presenter: Brian Balchunas, HDR, brian.balchunas@hdrinc.com

Title: No Decision too Tough with “All-in” Collaboration Utilizing the CMAR Delivery Method

Abstract: Synergizing a diverse team to expediently process challenging and difficult decisions is the true test to collaboration. This presentation will provide details of how the project team for the Little Patuxent Water Reclamation Plant (LPWRP) 8th Addition Biosolids Processing Facility collaborated to make seemingly unpopular decisions for the benefit of the client. With collaboration in mind, Howard County, MD chose to implement the Little Patuxent Water Reclamation Plant (LPWRP) 8th Addition Biosolids Processing Facilities Improvements project with the Construction Manager at Risk (CMAR) delivery method. HDR was selected as the Engineer and Clark Construction was selected as the CMAR for delivery of new biosolids processing facilities. These new facilities include improvements or addition of solids thickening, anaerobic digesters, dewatering, heat drying, gas handling, and sidestream treatment to meet an exceptional quality Class A biosolids while continuing to meet the Enhanced Nutrient Removal treatment performance of the existing water reclamation plant. The County, HDR, and Clark worked collaboratively together, agreeing to split the project in phases to facilitate both construction and operations. Design for the first phase was complete in late 2016 and the County, Clark, and HDR negotiated a Phase 1 Guaranteed Maximum Price (GMP) in December, 2016 and Clark was given a Notice of Award for Phase 1 construction. However, at the same time challenges were arising with the design and construction of the Phase 2 Dryer Facility. This facility was intended to be a stand alone facility constructed in parallel to the existing Solids Dewatering Facility, but site layout constraints presented major obstacles. Clark and HDR mobilized to provide re-design recommendations to the County within two weeks. The team met in a four-hour open workshop to evaluate three different options and determine the best option. At the conclusion of the workshop, the team selected the option with the highest construction risk, most unknowns, highest impact to Phase 1 construction and maintenance of plant operations. However, this was also the option with the highest probability to fit the budget and provided the best long term solution for the County. Since the decision was made, the design has been completed with modest changes to engineering and construction budget. To facilitate preparation for construction, the County solicited new proposals and negotiated a new contract for temporary solids treatment and hauling. In addition, the project team worked proactively to incorporate design changes to Phase 1 to reduce the overall construction schedule for Phase 2.

8/29/2018, Room 202, 4:00:00 PM to 4:30:00 PM,

Presenter: John Stullken, GHD, Inc., john.stullken@ghd.com

Title: Divide and Conquer: Breaking up a Large Linear Project Smaller Pieces to Achieve Goals

Abstract: Anne Arundel County, MD recently completed a $31.5 million capital improvement project to modify an existing sewage pumping station and construct a new 5 mile, 24" HDPE force main. The project allowed the County to decommission their Mayo WRF and convey all wastewater to the County's larger Annapolis WRF for treatment and disposal. During project planning, it was decided to divide the project into six separate construction projects, rather than bid the project as one large contract. This includes five bid packages for the force main and one bid package for the pumping station modifications. Dividing the projects into multiple contracts was intended to increase bidding competition, make the project more accessible to smaller local contractors, and limit the impact that delays in permitting and easement acquisition in any one portion of the project would have on other associated contracts. The Mayo pumping station and force main were completed and started operation in October 2017. The project delivery approach, benefits and challenges, and construction outcomes described in this case study can be used by owners and engineers currently planning or designing large linear infrastructure projects. Permitting Outcomes: The permitting approach varied based on the specific permit and issuing authority. Preliminary agency reviews made final permit approval and late-stage changes easier to obtain. Anne Arundel County grading permits were obtained individually so the construction disturbance and new impervious areas were divided among the six contracts, which reduced permitting requirements compared to an equivalent single contract. Easement Outcomes: Two contracts were impacted by easement acquisition times, resulting in a 10 month delay for those contracts. Both easements were through properties that hosted regional and national retailers, requiring additional approvals. While these two contracts started later than the other four, the delays were limited only to the contracts impacted by easements. Bidding Outcomes: Dividing the project into six contracts reduced the individual contract value to between $2.3 and $4.5 million. This allowed more local contractors to bid, but did not encourage as much bidding competition as anticipated. The force main contracts were consistently bid by the same three companies (one local), and four bids were received for the facilities project (all local). Construction Outcomes: Constructing multiple contracts in parallel increases required coordination between contractors to reduce the ripple effects of delays. It is critical to assign responsibility where contracts overlap (e.g., shared LOD, testing connections). Multiple concurrent contracts require good communication between the project teams and recording conditions and decisions throughout the project provide a clear record if issues need to be revisited. The Mayo force main had up to four simultaneous active contracts. Each contractor had their own schedule, requiring sufficient CM and engineering resources to keep pace with the multiple submittals, RFIs, and coordination. In the field, multiple contractors and job sites can strain inspection resources. Selecting CM and engineering firms with the resources and flexibility to meet the effort required is key to staying on top of all of the administration and coordination required to manage multiple contracts.

8/29/2018, Room 202, 4:30:00 PM to 5:00:00 PM,

Presenter: Ben Asavakarin, JMT, basavakarin@jmt.com

Title: Charting a new course: City of Baltimore DPW's first CMAR

Abstract: To comply with the Wet Weather Consent Decree, the City of Baltimore developed and adopted a comprehensive wet weather management plan, with the primary focus to eliminate sanitary sewer overflows (SSOs). Based on wet weather modeling, more than 80% of the volume of sewage overflowing the City's aged sanitary sewer system is attributable to the hydraulic restriction at the Back River Wastewater Treatment Plant (BRWWTP), that causes miles long sewer backups within the distribution system. In 2015, the City received bids for construction of the Headworks Facilities at the Back River WWTP that exceeded the City's budget. The City's commitment to Consent Decree compliance requires technical compliance to eliminate the hydraulic restriction in the collection system by December 2020. Understanding that there were significant challenges with cost and schedule certainty, the City completed an evaluation of project delivery methods to identify an approach to move the project forward and meet schedule and budget constraints. Alternatives considered by the City included procurement as a single contract, or multiple contracts through a variety of alternatives including traditional Design-Bid-Build, Construction Manager at Risk (CMAR), Progressive Design-Build, and Lump Sum Design Build. Following a market outreach effort to solicit input from contractors and other industry personnel, as well as an internal review of the project status with leadership and stakeholders, the City decided to deliver the project under the CMAR model. The Headworks Facilities at BRWWTP is the City's first CMAR project. In order to deliver the contract in this new procurement model, there were a number of new processes and documents that had to be developed, in addition to the typical required approvals for procurement. This presentation will discuss the City's efforts during three different phases of the CMAR procurement process. The presentation will discuss the process to develop the advertisement package and the CMAR contract. These documents had to be approved by the City's Design Build Executive Committee (DBEC), legal team, and the Board of Estimates. The presentation will discuss the development of criteria used to select the CMAR firm. Finally, the presentation will discuss the City's effort working with the CMAR during the pre-construction phase to develop the guaranteed maximum price (GMP) and specific scope of work for the project that was ultimately approved by the City's Board of Estimates. The presentation will be useful to utilities considering alternative delivery procurement methods. The presentation will provide a summary of lessons learned, with focus on the challenges of implementing a new construction procurement, the need to garner supports from multiple stakeholders, and the essential resiliency by the City.

8/29/2018, Room 203, 8:30:00 AM to 9:30:00 AM,
Presenter: Samuel Grant, Gannett Fleming, Inc., sgrant@gfnet.com
Title: Ethics for the Maryland PE
Abstract: Discussion of the structure of PE discipline in Maryland- the Annotated Code, the PE Board, its regulations, and review within the Maryland courts. Examine certain pertinent regulations, and real/hypothetical case histories. Discuss forms of ethics violations, PE Board enforcement, and possible consequences.

8/29/2018, Room 203, 9:30:00 AM to 10:00:00 AM,
Presenter: Mohammad Najafi, University of Texas at Arlington, najafi@uta.edu
Title: Chemical Emissions and Worker Exposure Associated with Cured-in-place Pipe (CIPP) Installations
Abstract: Since its introduction to North America in 1976, Cured-in-Place Pipe (CIPP) has provided an economical and environmentally-friendly alternative to open-cut replacement. A report was published by Purdue University on July 26, 2017, in the Environmental Science & Technology Letters, titled “Worksite Chemical Air Emissions and Worker Exposure during Sanitary Sewer and Stormwater Pipe Rehabilitation Using Cured-in-Place Pipe (CIPP)”, which challenges the safety of CIPP installation related to emissions released during the steam cure phase of the process, as well as the use of styrene based resins. Upon discovery of the claims made in the report, NASSCO established a global CIPP Workgroup consisting of industry experts as well as highly respected organizations, including the North American Society for Trenchless Technology (NASTT), the Water Environment and Reuse Foundation (WE&RF) and others. After finding the claims in the report to be premature and not conclusive, the CIPP Workgroup, under NASSCO's leadership, developed a 2-phase plan to include a comprehensive third-party literature review of publication(s) that propose the presence of organic chemicals in steam cure emissions and other available literature relating to emissions associated with the CIPP installation process. Also included is the actual sampling and analysis of emissions during the field installation of CIPP using the steam cure process. Phase 1 was conducted by the University of Texas in Arlington (UTA), Center for Underground Infrastructure Research and Education (CUIRE), with support from the Institute for Underground Infrastructure (IKT) in Germany. The literature review included documents from Purdue University, California Department of Transportation (Caltrans), Virginia Department of Transportation (VDOT), and the University of New Orleans. The report also includes the results of an extensive international literature search from sources in Canada, Australia, Germany and others. The results of this exhaustive, international review of CIPP emissions literature from the U.S. and Europe will be detailed in this presentation. Based on the findings from CUIRE’s research, Phase 2 encompasses sampling and analysis of emissions from steam cure CIPP installation sites, following a scope of services peer reviewed by a professional environmental consultant qualified to perform the work prescribed. The work conducted in Phase 2 is established to evaluate the following questions: 1). In addition to styrene, are there other volatile organic compounds (VOCs) or contaminants of concern generated during the curing process? Data collected here should quantify the VOCs and determine if there is an exposure concern, 2). Based on data collected, what is the estimated styrene emission per pound of resin cured?, 3). Do the data confirm or disagree with the findings discussed in the subject reports?. A status report of the Phase 2 research will be provided in this presentation. The research will be properly peer-reviewed to challenge or confirm the information previously published on this topic. NASSCO takes worker and public safety very seriously and hence the international CIPP Workgroup's goal in facilitating this effort is to uncover the truth, whatever it may be, and to respond to the results while keeping the best interests of worker and public safety in mind.

8/29/2018, Room 203, 1:00:00 PM to 1:30:00 PM,
Presenter: David Kerr, GHD, Inc., david.kerr@ghd.com
Title: Ice, Ice Baby! : Ice Pigging of a Sanitary Sewer Force Main
Abstract: A portion of Calvert County on the shore of the Bay is served by the Headworks Pumping Station. The Headworks Pumping Station is unable to convey all flow during wet weather, which results in flooding of the wet well to the emergency storage basin and requires the County to transport wastewater by truck to the wastewater treatment plant to avoid sanitary sewer overflows (SSOs). To address the issue, both an evaluation of the conveyance system and an Inflow and Infiltration (I&I) study of the gravity sewer system were conducted. The pumping station and 5 mile long force main make a portion of the conveyance system. They were constructed in the 1980’s and have, over time, experienced a significant decrease in capacity from the original design based on a previous study that included pressure monitoring along the force main, pump drawdown testing, hydraulic model development, and model calibration. Results of the study indicated the decrease in capacity is attributed to increased roughness in the force main and wear on the existing pumps. An action plan was developed and the first priority was to clean the force main and assess the effectiveness of the cleaning on the hydraulic capacity. This presentation will present steps the County took to prepare for the cleaning of the force main, the process of ice pigging to clean a force main, the results of the post cleaning evaluations, and lessons learned for the project.

8/29/2018, Room 203, 1:30:00 PM to 2:00:00 PM,

Presenter: Alex Palmatier, HDR, alex.palmatier@hdrinc.com

Title: Risk Based Predictive Maintenance Solutions for Sewer Main Cleaning - Schedules? We Do Need a Stinking Schedule!

Abstract: The City/County Utility manages more than 1,700 miles of gravity sewer pipes in the City of Winston Salem and Forsyth County. The goal of this presentation is to describe the innovative approach developed by CCU to clean their entire small diameter separated sewer system (18" and less) over a ten year period. This presentation will focus on tools and business processes that were implemented to achieve CCU's goal of developing a plan that balances the economic viability of a system-wide cleaning program with the risk of a catastrophic SSO in the system. The majority of the cleaning performed by CCU was in reaction to customer calls and complaints. This reactive cleaning occupied almost all of the CCU's cleaning resources. The remaining cleaning capacity was dispatched to high risk areas annually defined by CCU's GIS group. In order to develop a system-wide schedule and change the makeup of the cleaning work from reactive to proactive, it was essential for the CCU to evaluate their cleaning history and SSO history in order to prioritize the assets to be cleaned to minimize the risk of a catastrophic failure. CCU needed a way to prioritize and schedule out all of the work to be done so that an evaluation of the resource needs could be performed. Also, in order to ensure the effective cleaning was being performed, the CCU wanted pipes to be grouped in as tight of geographic clusters as possible. Once the manner of dispatch was developed, the system was prioritized for cleaning based on the risk of failure. The risk of each pipe was calculated by taking all applicable data sources and weighting the data in accordance with the goals of the system-wide cleaning requirement. Once a risk based schedule was developed, it was loaded into the City's CMMS, Cityworks. A tool was developed for tracking the data collected as each pipe is cleaned on the new schedule. This Cleaning Optimization Tool (COTools), imports the cleaning findings collected as each pipe is cleaned and an algorithm processes this data and makes recommendations to modify the cleaning frequencies to ensure that there is a continuous improvement cycle for the cleaning frequency decisions. Once the data is processed, the schedule is updated imported into Cityworks for the next cleaning cycle. At present, the initial schedule has been rolled out and the too, has been in operation for one full year. The tool has been used to schedule both hot-spot and system-wide cleaning work. It has been used to issue work orders to both internal crews as well as contracted cleaning crews. The tool is a dynamic, so as operating conditions change or as new data becomes available, modifications can be made to the tool to best represent current conditions. CCU has cleaned more pipe than in any of the previous five years. This cleaning increase, the risk based schedule and the positive feedback mechanisms programmed within the optimization tool contributed to a 25% decrease in SSOs last fiscal compared to the previous year.

8/29/2018, Room 203, 2:00:00 PM to 2:30:00 PM,

Presenter: Paul Sayan, Louis Berger, psayan@louisberger.com

Title: Using Data Analytics to Develop a Sewer Inspection/Cleaning Program – A Story from the Baltimore County Bureau of Utilities

Abstract: The Baltimore County Department of Public Works, Bureau of Utilities is responsible for maintaining the County's sewer inspection/cleaning level of service, which is to inspect and clean, where needed, the entire sewer collection system every 7 years. Recently the County developed a prioritization scheme to plan the next system cleaning program, which is scheduled to begin in 2019 and be completed in 2026. The prioritization scheme is based on the system's past performance, as measured (1) by the number of recorded basement backups, sewer overflows and mainline stoppages and (2) the date of the most-recent completed cleaning work. The County's sewer inspection/cleaning program is based on test results using the Sewer Line Rapid Assessment Tool (SL-RAT). Based on data analyses of the County's current SL-RAT program, only 1 in 10 sewers require cleaning; thereby, significantly reducing the amount of sewer cleaning work. The new cleaning program will expand the use of the SL-RAT technology to all sewers that are less than 15-inch diameter. To properly manage the inspection/cleaning program, all field activities have been added to the County's Primavera 6 schedule management software. The cleaning program schedule will be include budget and actual costs and footages to help the County project future budget requests and manage staff/equipment resources. Work progress metrics from the scheduling software, measured in terms of cost, baseline/actual durations and a combination of the two, will be reviewed to ensure that the inspection/cleaning program remains on-schedule and that there are minimal unanticipated cost overruns. The presentation will discuss how the County is using performance analytics to prioritize planned work and ensure that available staff, equipment and financial resources are best managed to address portions of the collection system that have underperformed. The presentation will also discuss some of the data analytics that were used as the basis for including and expanding the SL-RAT program and discuss the inspection/cleaning master schedule and the metrics that will be used to review the program's progress.

8/29/2018, Room 203, 3:30:00 PM to 4:00:00 PM,

Presenter: Christopher Garett, Brown and Caldwell, cgarrett@brwncald.com

Title: Consideration of PACP Limitations for Prioritization of Gravity Sewer Improvements

Abstract: Since 2002 the Pipeline Assessment Certification Program (PACP) has improved the assessment and prioritization of gravity sewer assets to an objective standard that tracks system condition over time. With over 200 options for describing structural, operation & maintenance and construction observations, PACP has added codes to refine evaluation of pipe materials and conditions. It has also integrated an Asset Management protocol for criticality as Consequence of Failure (CoF) and Likelihood of Failure (LoF). Subsequently, the coding system has provided a baseline for benchmarking system condition and rate of deterioration over time; however, the application of the information to rehabilitation has, at times, been uneven and misapplied. The issue at hand is the severity of the observation code as an indicator of pipe condition and remaining service life. The impetus for updating PACP observation codes is continuous improvement to provide value to the evolving condition assessment and rehabilitation industry. The future of the program (Version 8 and beyond) may be focused on addressing limitations of observation codes to material types, application and piping size. Yet the obvious drivers and potentially misapplied repair solutions for more severe structural observations will remain in relation to pipe (small vs large) and the variety of pipe materials. Generally speaking, programmed repairs have been focused on Grade 4 and 5 structural observations under the assumption that these are the types of defects that could lead to service disruptions and future sanitary sewer overflows (SSOs). For smaller diameter rigid pipes, such as vitrified clay and unreinforced concrete, this assumption is a cost-effective way to apply the PACP inspection observations. Unfortunately, this repair protocol may not be appropriate for larger diameter pipes, especially for reinforced concrete pipe (RCP), plastic pipes and ferrous metal (ductile iron and steel) pipes. In summary, PACP structural grades may be too conservative for estimating RCP and plastic pipe remaining life and may not be granular enough to accurately reflect ferrous pipe condition. This presentation provides an overview of the inherent limitations of PACP for larger diameter piping that includes a discussion of the following: · the business case for normalizing coding based on size and material, including a discussion on how municipalities are addressing this limitation by adjusting grades or creating alternative grades beyond the 1 to 5 within PACP · rationale for applying structural assessment tools for adjusting structural coding grades for larger diameter reinforced concrete, ferrous metal and thermoplastic piping · recommended desktop evaluations for normalizing condition grades to better reflect remaining system life. A project example is highlighted supporting this thesis by illustrating the use of a criticality-based PACP model developed in 2004 compared to the normalization of PACP grades. The system example is based on larger diameter concrete gravity sanitary sewer that was rehabilitated based on PACP condition assessment prioritization. The project example presents analysis of CIPP post rehab including comparison of design decisions that would have been recommended if Version 7 codes and rehabilitation technology advancements were available.

8/29/2018, Room 203, 4:00:00 PM to 4:30:00 PM,

Presenter: Andrew Fuller, AECOM, andrew.fuller@aecom.com

Title: Force Main Condition Assessment Modeling at Virginia Beach

Abstract: For almost a decade, the City of Virginia Beach Public Utilities (City) has been leading a post-SSES force main condition evaluation program that resulted in build-out of a systems-specific Risk Tool used to prioritize replacement. The initial stages of the program included large-scale inference and indirect condition assessment techniques supplemented by the deployment of in-situ and direct-assessment technologies to collect data and understand deterioration catalyst. These efforts, coupled with opportunistic pipe-sampling, showed that the City's corrosive soil characteristics are driving the external corrosion of their ferrous pipelines and force main failures. Using the condition assessment data, an Excel-based custom Risk Tool was developed to assess and prioritize over 197 miles of force main assets. The tool assesses likelihood of failure (LOF) through two major functions: internal (hydraulic-model based) and external loading, and a deterioration model which considers the probabilistic rate of deterioration based on actual data from condition assessment inspections and localized soil-corrosivity conditions. The LOF and consequence of failure ratings are combined to compute overall risk. The City has the ability to display those assets and soil characteristics spatially and generate budgetary capital cost figures for replacement. The "soils map" is very often used to gain a quick, high-level understanding of the corrosivity of a specific location. Currently the program is developing a plan to integrate the tool's spreadsheet functionality within the existing asset management systems and work processes of the City, allowing cost-effective automatic updates as work orders and capital improvements are executed. This presentation offers utilities a chance to see how their existing data (records, GIS, hydraulic model) can be combined with targeted direct/indirect condition assessment to infer condition of the overall system; and how this condition understanding can be used to support informed decision making for the forecasting of long term capital improvements.

8/29/2018, Room 203, 4:30:00 PM to 5:00:00 PM,

Presenter: Renni Zhao, DC WAter, renni.zhao@dcwater.com

Title: A Composite SIPP Design Empowered by a Comprehensive Evaluation

Abstract: In Washington DC, most of larger diameter combined sewer (larger than 10 ft in diameter) were constructed in the beginning of 1900's. This trunk line plays critical role in controlling the sewage and surface flow through the neighborhoods of the nation's capital. The century old design philosophy of the "roman arch" and the "inert" masonry material utilized in the sewage tunnel of different arch shapes present a challenge to today's pipeline engineers in how to evaluate and rehabilitate without compromising its stability economically. In large tunnel inspection, many defects found by visual CCTV inspection may be shown as minor defect but be over addressed as "fully deteriorated" based on the age and construction of the sewer or vice versa. Past experience has shown that even through the interior of tunnel has appearance of minor or no defects, tunnel side wall can be in poor condition as a result of deterioration occurring at the exterior of the tunnel wall and progress inward. In DC water large tunnel inspection, the intent of NDT are to use sonic/ultrasonic impact-echo test and pipe penetrating radar (PPR) data to evaluate: 1. full thickness condition of tunnel liner at a certain intervals and locations where spalling, punky soft concrete, water leakage into the tunnel, tree roots penetration through the tunnel liner, or other suspected defect area are evident. 2. mechanical characteristics of concrete, such as the elastic deformational characteristics of the concrete, including the Young's, Bulk, and shear modulus values as well as Poisson's ratio and a calculated strength value. These values are principally controlled by the presence of cracking, voiding or deteriorated strength concrete DC Water engineers started to reflect on the pros and cons of a composite liner design for most of the large combined sewer tunnels in conditions with the most common "wear and tear", i.e. hoop fractures, longitudinal fractures, water infiltration, missing bricks, heaved bench bricks, etc. By analyzing with preliminary in-house Finite Element Model (FEM), built with "hinges" as full-depth cracks in the crown simulating a "perfect" arch, we realized the longitudinal fractures do not necessarily destabilize the tunnel if the erosion originated with the fracture remains minimal and the abutment, i.e., springline remain sturdy. A composite liner may suffice in achieving that by working with the host tunnel that may remain indefinite. In this presentation, we will demonstrate how the DC Water to evaluate and rehab large masonry tunnel by using of GPR, PPR, impact-echo testing methods and geopolymer composite liner.

8/29/2018, Room 204, 8:30:00 AM to 9:00:00 AM,

Presenter: Glenn Pearson, Prince William County Service Authority, gpearson@pwcsa.org

Title: Satellite Leak Detection Pilot Study - Is it Worth It?

Abstract: Prince William County Service Authority (SA) has an on-going commitment to continuously improve water service to its customers. Identifying and eliminating leaks in the potable water system is part of that commitment. Currently the SA performs leak detection routinely in troubled areas based on water meter information, visual siting, and concentrating on older pipe systems in their service area. The leaks are categorized and prioritized for pipe require repair, rehabilitation, or replacement. In an effort to streamline this process, the SA has performed a pilot study using satellite technology spectral image data acquisition, coupled with GIS-based algorithmic analyses to identify potential leaks in the SA's potable water distribution system throughout one of their oldest low pressure zones.The results of this pilot study will demonstrate the cost-effectiveness of satellite technology leak detection versus traditional leak detection to locate potable water leaks. The process began with the initial polygon boundary geometry determination, coupled with the SA's distributon GIS information, and up to three satellite passes to evaluate 1,350 square miles of the service area to gain and refine the imagery used to determine leak locations up to 15 feet below the surface. Each satellite pass refined the algorithms and increased the accuracy of the results. Field verifications were performed to confirm and prioritize the results of the images (potential leaks). The final goal of the pilot study was to determine the cost-effectiveness of the satellite imagery technology versus the traditional methods to accurately and routinely identify and quantify potable water leaks, using manpower efforts and costs of the imagery over a five year period. During this presentation the audience will learn about the method, costs, and details of this technology compared to traditional methods of leak detection.

8/29/2018, Room 204, 9:00:00 AM to 9:30:00 AM,

Presenter: Michael Ariante, Mott MacDonald, michael.ariante@mottmac.com

Title: Pressure Monitors Emerging Technology – A Head to Head Comparison of Remote Pressure Monitoring Units

Abstract: We will review the findings of a pilot study at DC Water to compare pressure monitoring technologies and provide a real-world overview of the current state of available technologies. To achieve strategic goals of optimally managing infrastructure and enhancing operating excellence, DC Water is transforming its water distribution and wastewater collection system into a "Smart Water System." A key component of this smart infrastructure project is remote pressure monitoring which allows the utility to constantly monitor the system's pressure in key locations in each zone. In addition, remote pressure monitoring is expected to help identify and control pressure transients that will ultimately reduce pipe breaks, and identify leakage. The project pilot was implemented to evaluate five separate pressure monitoring systems. Cost of installation, installation construction requirements, cost of operation and maintenance, unit durability, transmission and communication, data collection and management, and data analysis, was compared. At the start of this pilot, research of these parameters determined which remote units would be the most optimal to evaluate. One key parameter that this pilot focused on was the data resolution transmitted by each device. Three of these units communicate through cellular networks, one communicates through the Sigfox network - a proprietary narrow band Low Powered Wide Area Network (LPWAN) that operates in unlicensed radio bands - and one communicates through a LoRa network – an open LPWAN protocol. Another key parameter is the ease of construction and installation of each unit which will assist in evaluating the feasibility of a system wide implementation of the units. This presentation will review the findings of the pilot study and provide a head-to-head comparison of the data sets generated. Each of these previously mentioned parameters play an important role in the overall effectiveness of remote pressure monitoring.

8/29/2018, Room 204, 9:30:00 AM to 10:00:00 AM,

Presenter: Michael Mulcare, Mott MacDonald, michael.mulcare@mottmac.com

Title: Getting Remote Smart Water Sensors Talking – The Growing List of Options

Abstract: Smart water technology is intricately linked to advances with the Internet of Things (IoT). Those advances have allowed water utilities to deploy a range of sensors to their networks to provide new understanding and control of these critical systems. The prospects for new innovations in smart water are greater than ever thanks in part to IoT, which is projected by McKinsey Global Institute to generate between $4 and $11 trillion in value by 2025. Moreover, it's estimated that 127 new devices are connected to the Internet every second. The incredible rate of IoT deployment has driven parallel development in Information and Communication Technology (ICT). There now exist many options for connecting new sensors deployed across water distribution and sewer collection systems to local networks allowing implementation of sophisticated smart infrastructure solutions. This has enabled great flexibility to implement ICT that provides the best fit for an organization's needs. The downside to all this growth and constant evolution of technology is that connectivity solutions become obsolete within a few years while the water/wastewater infrastructure it is intended to support is dated in terms of decades. Selection of the right ICT requires review of numerous considerations including data throughput (bandwidth), range, cost, reliability, power demand, system interoperability, installed coverage, proprietary technology restrictions, and expected or planned obsolescence. The connectivity technologies are generally broken into four categories including cellular, low power wide area network (LPWAN), extraterrestrial, and licensed proprietary RF communications. Each of these have general characteristics relating to bandwidth, range, power, and cost that drive primary selection based on the application. Within these categories, there are a number of options and additional considerations. This presentation is intended to familiarize organizations looking to deploy remote sensor technology with options for transmitting the data generated to databased where it can be accessed and analyzed. It will discuss the characteristics of different ICT options as well as the factors that must be considered when making the selection. Review of specific technologies within the different categories will be summarized such as 3G, LTE-M, NB IoT and 5G for cellular technologies and SigFox, LoRa, Ingenu, and Weightless for LPWAN. Communication networks tied to proprietary equipment technologies will also be reviewed as they relate to Advanced Metering Infrastructure (AMI) or other smart infrastructure deployments. Finally, integration of ICT with enterprise, cloud, and protected networks will be introduced.

8/29/2018, Room 204, 1:00:00 PM to 1:30:00 PM,
Presenter: Sarah Hanna, McKissack & McKissack, SARAH.GHALI@MCKISSACKDC.COM
Title: Assessment and Rehabilitation of 30-inch Water Main on Historic Key Bridge
Abstract: There are two federally owned water mains on the Francis Scott Key Bridge (Key Bridge), a 30-inch steel spiral weld water main constructed in 1942, and a 16-inch cast iron water main installed in 1985. These two water mains convey water to critical customers like the Pentagon, Ronald Reagan Washington National Airport, and the Arlington National Cemetery. Each water main spans about 1,700 feet between M Street, NW in Washington, DC and George Washington Memorial Parkway in Arlington, VA. Access to the water mains is limited to the portion of the water main by the bridge abutments. In September 2016, DDOT mobilized a Contractor to begin structural rehabilitation of the historic bridge. The rehabilitation work requires expansive scaffolding and use of a barge mounted man-lift with a 40-foot boom to access the bridge from the Potomac River. During the bridge rehabilitation photos of a corroded pipe support beam and pipe dresser coupling emerged. DC Water agreed to take advantage of the temporary access to conduct a visual assessment of the water mains across the bridge span. Due to the pipe age, size, and criticality, DC Water decided to focus the project on performing further assessment and implementing repairs on the 75 year old 30-inch steel water main. Repairs included replacement of pipe anchors, pipe support beams and hangers, and coating of structural components. As the scaffolding was erected for bridge repairs, the pipe was inspected and repairs performed in phases that the DDOT project dictated. The presentation will discuss: 1. Execution of a visual inspection of the pipe fittings 2. Selection of the tool and execution of the pipe condition assessment 3. Decision process to externally repair the pipe, rather than rehabilitate or replace it 4. Expedited design development to avoid impacts to DDOT's project schedule 5. Repair of the water main including surface preparation and coating of the pipe, and replacement of pipe anchors, and steel hanger beams. 6. Condition assessment and construction costs

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8/29/2018, Room 204, 1:30:00 PM to 2:00:00 PM,
Presenter: Sonia Oton, Mott MacDonald, sonia.oton@mottmac.com
Title: Getting the (W)hole Story - Condition Assessment and Emergency Repairs of the DC Water's 48-inch Steel Inlet/Outlet Brentwood Reservoir Water Mains
Abstract: In September 2015, DC Water was performing a scheduled pipe condition assessment of two parallel 48-inch PCCP water mains, and decided to extend the inspection with a visual robotic inspection tool to the adjacent steel water mains connecting to Brentwood Reservoir, a critical storage facility. The visual investigation determined that the 48-inch inlet and outlet steel mains had experienced lining deterioration, internal joint seal leakage, and potential pipe wall loss. Shortly after, in October 2015, chlorinated water surfaced in a communication manhole nearby the reservoir, being the 48-inch inlet/outlet steel mains the most likely source of the water. The first reaction was to replace the entire stretch of piping, but there was insufficient budget availability in the Capital Improvement Program to implement such costly repairs. DC Water stakeholders agreed on spending significantly less money by conducting a detailed pipe condition assessment to refine the level of repairs needed, while simultaneously providing the urgent repairs to the holes causing the leaks. This approach proved to be extremely beneficial as numerous assumptions on the condition of the pipe based on the visual inspection were invalidated by the refined pipe condition assessment data, demonstrating the importance of having a detailed pipe condition assessment prior to implementing an expensive pipe rehabilitation. The presentation will discuss: (1) The execution of the pipe condition assessment using an electromagnetic tool, (2) The implementation of internal urgent repairs based on the visual inspection, (3) Comparison of the visual inspection data to the detailed condition assessment data, (4) The installation of a cathodic protection system, and (5) Cost analysis of the condition assessment and urgent repairs.

8/29/2018, Room 204, 2:00:00 PM to 2:30:00 PM,
Presenter: Nirav Shah, RK&K, nshah@rkk.com
Title: Using the "Toolbox Approach" for Condition Assessment and Corrosion Study of the Brock Bridge Road Water Transmission Main (BBWTM)
Abstract: The Brock Bridge Road Water Transmission Main (BBWTM), a 20-inch ductile iron water main, was constructed in the early 1990s, is the sole source of water supply to Anne Arundel County's Russett Greens Community and other large services, and is considered a high criticality asset. Having already experienced two failures on this main, the County decided to evaluate the condition of this critical supply main with the primary objective to determine the useful life of the pipeline and to identify any short or long-term strategies or repairs that can be implemented to maximize the remaining useful life of this critical asset. Various condition assessment technologies, including direct and indirect methods, were considered for use on this project. A "Toolbox Approach" was utilized to select the most appropriate tools to fit the application and identify the best use of resources to focus inspection services where most appropriate. This presentation focuses on the overview and selection of the condition assessment methodologies and the phased approach to condition assessment of this high criticality water main. The study included Soil Corrosivity Analysis, Pressure Transient Monitoring, Leak Detection and Average Pipe Wall Thickness Assessment, and Pipeline Risk Assessment / Remaining Life Analysis.

8/29/2018, Room 204, 3:30:00 PM to 4:00:00 PM,

Presenter: Michael Brown, Gannett Fleming, Inc., mtbrown@gfnet.com

Title: Successful Implementation of a Proactive Main Replacement Program in Allentown PA

Abstract: In 2013, the Lehigh County Authority (LCA) assumed control of the City of Allentown, PA water and wastewater systems through a 50-year Concession and Lease Agreement ("Agreement"). The Agreement includes a series of operating and management standards, established based on industry best practices, designed to ensure adequate service is maintained to City residents throughout the term of the Agreement. However, in the years preceding the Agreement, capital projects and proactive maintenance of the systems were often deferred, leaving the system in need of capital and maintenance investment. The City of Allentown water system includes over 240 miles of main, of which over 100 miles is aging cast iron main and over 60 miles is over 100 years of age. The Agreement between LCA and the City of Allentown required replacement of a minimum of 1 mile of main in year 1 and 2 miles of main yearly thereafter. LCA teamed with Gannett Fleming in 2013 to manage this main replacement program. The main replacement program, which will be entering its 5th year in 2018, includes yearly cycles of prioritization of main replacements, design, bidding, and construction. The co-presentation between LCA and Gannett Fleming will present a description of the process utilized to complete the program, focusing on the lessons learned during the 3-year history of the main replacement program that have led its success with a continuous improvement in the process. The presentation will provide perspective from both the consultant and owner views. Specific features of the main replacement program that will be discussed include: a practical and efficient GIS-based main prioritization program, coordination with numerous stakeholders including the City and various other utility and infrastructure entities which has led to beneficial cooperation and economic savings, continuous improvement of the bid documents to minimize change orders, construction in a challenging urban environment, and the lessons learned process that has been a significant factor in the success of the program.

8/29/2018, Room 204, 4:00:00 PM to 4:30:00 PM,

Presenter: Wesley McBride, WSSC, wesley.mcbride@wsscwater.com

Title: Great! You Have a Large Valves Inspection Program…Now What?

Abstract: The Washington Suburban Sanitary Commission (WSSC) was established in 1918 and is currently among the largest water and wastewater utilities in the nation. The water transmission and distribution network at WSSC is over 5,600 miles long and serves around 1.8 million people in Prince George's and Montgomery counties in Maryland. There are approximately 1,500 large valves in the water transmission and distribution system, ranging from 16" to 96" in diameter. About half of those large valves were installed between 1920s through 1960s, some could not be operated without repairs and many were reaching the end of their useful life. This presented a challenge for WSSC because failure of large valves could affect the reliability of water supply, customer relations, and fire protection. As a proactive measure to prevent large scale interruptions, WSSC reinstated the Large Valves Program to exercise, repair, collect data, and assess the condition of large valves. To ensure data accuracy and analysis, work performed under this program was tracked through a work order maintenance management system. The program data was utilized in WSSC's Asset Management Plan to develop a comprehensive strategy that not only maintains and tracks those valuable assets, but also enhances their reliability by establishing priorities for valve replacements and aids in updating a holistic report which covers Commission-wide initiatives. This presentation will provide an overview of the Large Valves Program at WSSC, challenges encountered before, during and after implementation of program initiatives, lessons learned, and future efforts that focus on enhancing Large Valves Program processes.

8/29/2018, Room 204, 4:30:00 PM to 5:00:00 PM,

Presenter: Benjamin Cownie, Black & Veatch, cowniebc@bv.com

Title: Reducing Risk through Adaptive Planning: Charlotte, NC

Abstract: Charlotte Water provides water service to a population of more than 860,000 people in and around the City of Charlotte in Mecklenburg County, North Carolina at an average day demand of 100 MGD. The distribution system is supplied by 3 water treatment plants and includes 12 storage tanks, 5 booster pump stations, and nearly 4,200 miles of water main up to 72-inch. Leading into the economic downturn in 2007, the City of Charlotte was growing rapidly and the system was being planned for continued growth, with significant planned investments in hydraulic capacity, water treatment and system storage. Following the recession (and corresponding reduction in projected growth), many of those projects were cancelled or deferred. It was clear that a more flexible, adaptive and interactive approach to capital planning was needed to continue to meet customer demands while reducing failure risk in the future. This presentation will focus on the innovative adaptive planning approaches developed to enhance Charlotte Water's planning process and reduce the system risk, including a pipeline risk prioritization using GIS information, break history, likelihood and consequence of failure criteria and Innovyze InfoMaster; a system resiliency evaluation to understand the cost of providing resilient supply to customers under various outage scenarios; development of a dynamic and interactive CIP tool for viewing and managing recommended improvement projects; and detailed project data sheets to enable clear communications of project scope and benefits with customers and stakeholders. This presentation will be of interest to utilities who are (as Charlotte Water was) stuck in the traditional world of CIP planning where a master plan report is written and almost immediately outdated. It will show how through adaptive planning, Charlotte Water now has the tools to actively manage and update their CIP to minimize risk over time, long after the master plan is complete.

8/29/2018, Room 205, 8:30:00 AM to 9:00:00 AM,
Presenter: Fernando Pasquel, Arcadis, fernando.pasquel@arcadis.com
Title: Improving Stormwater Program Performance: Simulated Audits and Program Review Scorecard
Abstract: EPA considers pollution from all diffuse sources, including urban stormwater pollution, to be important sources of contamination in the nation's waters. Municipalities MS4 programs address water quality issues, and many have dedicated stormwater management fees or taxes to provide a funding mechanism to support both regulatory and performance requirements. There are several procedures that can be implemented to review and improve overall stormwater program performance – including use of a simulated audit and stormwater management program scorecard review. All MS4s are subject to audits of their stormwater management programs by state and federal regulators to assess compliance with their stormwater NPDES permits. These audits can lead to enforcement actions if deficiencies in permit compliance are uncovered, ranging from simple corrections to costly fines for those that have skirted their regulatory obligations and are unprepared. Likewise, every stormwater program, including the user-fee-funded stormwater programs, evolve and have changing needs and requirements; therefore, periodic program evaluation is useful to address changing program needs, circumstances and increased stakeholder expectations. Evaluations address three program areas: functional elements, revenue elements, and management elements. This presentation will review case studies across a range of MS4 entity types and describe how the fundamental elements of an audit: major findings, deficiencies, areas of improvement, positive program elements, and recommendations for improvements, are common to all. It will also demonstrate the application and use of a scorecard method to assess and determine a specific action plan to enhance and improve an existing stormwater management fee program.

8/29/2018, Room 205, 9:00:00 AM to 9:30:00 AM,
Presenter: Kerstin Geba, AECOM, kerstin.geba@aecom.com
Title: SWMM Modeling Benefits and Considerations
Abstract: SWMM methodology has been around for over 30 years and during that time it has progressed tremendously. A SWMM model developed with reliable data can assist in identifying the locations of possible hydraulic deficiencies within a Stormwater conveyance network. For the Drum Point Creek Watershed (Study Area) in the City of Chesapeake, Virginia, the SWMM model not only determined possible hydraulic deficiencies, but it also helped in the development of the potential solutions. More importantly, the SWMM model indicated the impact the study area has on the Pughsville Watershed for the City of Suffolk, Virginia, located upstream. During Hurricane Matthew and Tropical Storm Julia, John Street, located in the Pughsville Watershed, suffered significant flooding which was in part attributed to the hydraulic deficiencies in the Study Area. The SWMM Model indicated that in order to alleviate the flooding in John Street, improvements must occur not only in the Study Area, but also in the Pughsville Watershed. If improvements are only made in the Study Area, John Street will still experience significant flooding. This analysis was performed using iterative process where improvements are suggested at the farthest downstream points and analyzed for hydraulic impacts to support results moving gradually upstream. This method allowed for hydraulic deficiencies to be quickly located and for appropriate system improvement to be suggested. Additionally, an iterative method allows for different system configurations to be analyzed and provide the maximum benefit. This presentation will show how the SWMM Modeling for the Drum Point Creek Watershed for the City of Chesapeake helped determine possible hydraulic deficiencies, potential solutions, and how they impacted the Pughsville Watershed in the City of Suffolk.

8/29/2018, Room 205, 9:30:00 AM to 10:00:00 AM,
Presenter: Arthur Sung, City of Baltimore, Hsin-Chuan.Sung@baltimorecity.gov
Title: 1-D and 2-D Coupled Hydraulic Modeling and Alternatives Development to Assess Flooding Risk in Urban Settings: A Case Study of Harris Creek Watershed
Abstract: A 1D-2D coupled hydraulic and hydrologic model is developed for Harris Creek Watershed which is located in the South East side of Baltimore, MD to conduct flood risk assessment. The drainage system in the study represents a very complex urban area built a century ago covers 1450 acres (2.2 square miles), and mainly consists of pipelines, large creeks and engineered channels. The land uses in the watershed include mainly residential and commercial buildings. Other land use and hydraulic and hydrologic features in the watershed include parks, roads, and a downstream boundary tidal influenced channels at the inner harbor. Existing Harris Creek drainage system was modeled in 1-D XPSWMM platform representing both the hydraulic and hydrologic system. Information gathered from simulation run results of the 1-D model was not adequate to qualitatively and quantitatively characterize the flooding risk, and flooding flow paths and locations. The 1-D model is not capable of depicting the rainfall-to- runoff from urban areas hydrologic processes including surface storage, infiltration and surface runoff. InfoWorksTM ICM, an advanced and state of the art modeling tool, was used to evaluate the hydraulic performance of the drainage system with a truly integrated platform depicting the interaction between above-ground conditions and underground pipe networks, and fate of 2-D above-ground flow. Simulation run results from the 1-D and 2-D coupled model indicated the response of the drainage system to varying design and recorded storms. In particular, simulation runs which applied the 10-yr 24-hr design storm indicated a poorly performing drainage system with instances of flooding at different parts of the study area with extreme flooding depths as high as 7-ft. Multiple alternatives were developed to mitigate the flooding and conveyance issues existing in the Harris Creek drainage system. Preferred alternative was identified which used a combination of Gray and Green Infrastructures to provide a level of service which controls the 10-yr 24-hr design storm.

8/29/2018, Room 205, 1:00:00 PM to 1:30:00 PM,
Presenter: Erik Michelsen, Anne Arundel County Watershed Protection and Restoration Program, pwmich20@aacounty.org
Title: "Trading in Time:" Using Public Investments in Wastewater Infrastructure Upgrades to Build More Sustainable Stormwater Programs and Achieve Permit Compliance
Abstract: For most Phase 1 MS4 managers in Maryland, it was apparent very early on in the current permit term that compliance with the 20% restoration requirement in the permit was going to be impossible to achieve in a 5-year time frame. Over the course of the past couple of years, MS4 representatives have been meeting with MDE to chart a path forward – one which acknowledges the tremendous amount of stormwater work going on in the state but also recognizes that, without some solution outside of the existing permit and accompanying guidance, most, if not all, the State's Phase 1 MS4s are on the path to non-compliance. Considerable "overperformance" of many of the wastewater treatment plants (WWTPs) in the state – including those owned by MS4-holding entities – has presented one potential path forward. Real, significant, local pollutant reductions achieved by these WWTPs and a nutrient trading framework provide an opportunity both for near term MS4 compliance and the development of integrated, sustainable local stormwater programs that can be conducting restoration for decades to come.

8/29/2018, Room 205, 1:30:00 PM to 2:00:00 PM,
Presenter: Tim Schmitt, LimnoTech, tschmitt@limno.com
Title: The Value of Evaluating and Updating Historic BMP Data: Maximizing Credit for Work You've Already Done
Abstract: Many MS4 permittees are faced with requirements to reduce loads to meet Chesapeake Bay and local TMDL requirements. In Maryland, permittees must also increase the amount of treated impervious surface during every permit cycle. With often limited funding and land or opportunities available to add new stormwater management, it is critical to accurately account for BMPs that are already in the ground. Yet many MS4s have inadequate records of their existing BMPs, and this lack of data [prevents the permittee from claiming full credit for existing BMPs. LimnoTech recently completed a project for Anne Arundel County to update its historical BMP database to ensure that historical BMPs could be fully reported and receive full load reduction and impervious surface restoration credit. This paper will describe the process that LimnoTech used to go through historical BMP data, identify drainage areas, and update key data fields such as installation dates, water quality design parameters, and treatment train information. The presentation will also discuss methods to ensure initial data collection of BMP data produces adequate information during the BMP permitting process.

8/29/2018, Room 205, 2:00:00 PM to 2:30:00 PM,
Presenter: Meredith Neely, CH2M/Jacobs, neely.meredith@gmail.com
Title: MS4 Stormwater Retrofit Case Study in the Patapsco Tidal Watershed
Abstract: Chesapeake Bay restoration and MS4 permit compliance continues to dominate the stormwater regulatory landscape in Maryland. Now well into their initial restoration-based permit term, many Phase 1 MS4s have faced significant challenges towards restoring 20% of their untreated impervious surfaces. Using a watershed approach to restoration and funding from the stormwater remediation fee, the Anne Arundel County Watershed Protection and Restoration Program has made steady progress towards their targets by completing capital projects to restore eroded streams, redesign failing outfalls, and modernize aging stormwater ponds. This presentation will provide a stormwater retrofit case study for the heavily urbanized Patapsco Tidal Watershed. Case studies will focus on two projects located on opposite ends of the watershed: the Heritage Hills stormwater park in Glen Burnie; and the Rock Creek subwatershed restoration project in Pasadena. The Heritage Hills project is located in an undeveloped area near Ritchie Highway, wedged between four residential developments and two dead roads. The design includes retrofit of an outfall basin to step pool stormwater conveyance (SPSC), and offline treatment of a neighboring storm drain system using stepped infiltration berms, for treatment of 9.2 impervious acres. The project will also revitalize surrounding residential areas by improving aesthetics and cleaning up previously unmaintained areas. The Rock Creek restoration project includes a subwatershed-wide approach to retrofit design, combining both upland and downstream treatment. The project area encompasses nearly the entire headwaters of Rock Creek, including 6,200 feet of stream restoration, repair of three eroded outfalls using SPSC, seven pond retrofits, and two new stormwater BMPs. The project has provided the unique opportunity to implement a holistic restoration approach to an entire subwatershed, yielding an estimated treatment of over 50 impervious acres. Lastly, this presentation will provide an overview of how this case study fits into the County's broader MS4 program restoration goals.

8/29/2018, Room 205, 3:30:00 PM to 4:00:00 PM,

Presenter: Sophia Liskovich, Gannett Fleming, Inc., sliskovich@gfnet.com

Title: Site-Sensitive Engineering Creates Bay-Friendly Stormwater System

Abstract: By doing its homework and developing a smart, sustainable design, the design team found a creative way to build a stormwater management system for a bayside community that desperately needed one but didn't have the budget. The new system completely transformed the treatment of stormwater runoff in Sylvan Shores, a neighborhood of 250 homes along the South River of the Chesapeake Bay. Its design and construction were fully funded by a $1.87 million grant from the Bay Restoration Fund that the team obtained during the onset of this project. Built in the 1940s, Sylvan Shores had no stormwater management system before this project. During storm events, water pooled in low spots, puddles spread across roadways, and residences regularly flooded, causing damage and costly repairs. Because the community lies within the Chesapeake Bay Critical Area, untreated runoff flowing directly into the South River was a major concern. Untreated runoff brings a variety of pollutants into the bay, including nitrogen and phosphorus. Both nutrients can lead to aggressive algae blooms, which pose a grave threat to aquatic life. Maryland established the Bay Restoration Fund in 2004 to reduce nitrogen in the Chesapeake by 7.5 million pounds and phosphorus by 260,000 pounds each year. The community's stormwater treatment system was designed to help meet these goals. At Sylvan Shores, carefully sited sand filters, grass swales, and micro-bioretention facilities now naturally filter runoff before it enters the South River. Permeable pavers prevent street flooding and allow stormwater to drain through the soil. The sustainable benefits of the new system are significant. The team worked hand-in-hand with Anne Arundel County officials to ensure that construction was completed on time, fulfilling grant requirements. The team coordinated construction plans with work done for a County sewage and water system upgrade in the area, using the same contractor and overall county grading permit. As the project progressed, the team submitted the designs of specific areas one at a time to county officials, modifying the permit. This made it possible for the same project bond to be used for each individual feature as it was constructed, keeping the project on schedule. A shining example of residential stormwater management best practices, the Sylvan Shores project has prompted neighboring communities to inquire about systems for their own residents.

8/29/2018, Room 205, 4:00:00 PM to 4:30:00 PM,

Presenter: Ian Rodway, Straughan Environmental, Inc., irodway@straughanenvironmental.com

Title: Stream Stabilization for Asset Protection: Successes and Lessons Learned

Abstract: The Washington Suburban Sanitary Commission (WSSC) entered into a Consent Decree with the federal government and local stakeholders which requires them to eliminate sanitary sewer overflows (SSO), which are primarily caused by inflow and infiltration (I&I). As part of its Sewer Repair, Replace, and Rehabilitate (SR3) Program, WSSC has undertaken a massive effort to both rehabilitate and protect its aging infrastructure. Significant portions of WSSC's sewer systems were constructed within environmentally sensitive areas, primarily forested stream valleys. Urbanization, lack of stormwater management, and placement of sewer crossing and pipe protection have influenced modern stream channel forms. Additionally, erosion and lateral stream migration have resulted in the exposure of once covered and protected sewer systems. As part of the SR3 program, WSSC has committed to construct stable stream channel features to provide long term asset protection. In total, approximately 150 exposed assets will be protected as part of this program. WSSC has taken a different approach to protecting its assets than had been done historically, utilizing multiple grade control structures to raise the streambed rather than simply installing a concrete encasement. To ensure success, WSSC has employed stream restoration specialists to provide oversight for these projects. During construction the stream restoration specialist acts as a physical presence to work with contractors, Parks, WSSC and regulatory agencies to interpret design plans, notes, specifications, details, dimensions, tie-ins, aquatic habitat protection and to ensure the construction process meets the intent provided in the design. The focus of the presentation will be the stream restoration specialist's role in maximizing the success of stream stabilization construction for long term asset protection as well as the lessons learned during the last four years of construction.

8/29/2018, Room 205, 4:30:00 PM to 5:00:00 PM,

Presenter: Joseph Cherry, AP/M Permaform, info@permaform.net

Title: Trenchless Rehabilitation Saves Grottoes, VA Culverts – And Money - Without Disrupting Traffic

Abstract: Grottoes, Virginia discovered severe corrosion in portions of their stormwater system during a routine annual inspection. A large set of elliptical CMP culverts didn't pass inspection. The culverts were in poor condition with severe corrosion. Individual sections were failing and misaligned, and the town's consultants recommended replacement. Complicating the issue, the failing pipes were four parallel culverts which are all quite large, 70" by 44", running directly underneath Dogwood Avenue, one of Grottoes' two main thoroughfares. The town obtained cost estimates for trench-and-replace from Brunk & Hylton Engineering, Inc. The price was high and the plan called for significant and lengthy traffic disruptions. Grottoes Town Manager Jeff Nicely had seen a trenchless rehabilitation process called CentriPipe that looked like it could be useful in this situation. In researching the solution, Nicely discovered the project cost was 15 percent less than the dig and replace estimate they had received, and had the added benefit of eliminating weeks of traffic disruptions. This paper will review the breadth of aging infrastructure situation that state and local agencies in the United States are facing, the engineering considerations in addressing failures, and the process, quality control measures, and results of the critical project in Grottoes, Virginia.

8/29/2018, Room 206, 8:30:00 AM to 9:00:00 AM,

Presenter: Ken Knutsen, Barton & Loguidice, D.P.C., kknutsen@bartonandloguidice.com

Title: Anaerobic Digestion Biogas Systems - Practical Considerations for Design, Start-up and Operation

Abstract: A complete overhaul of the Village of Malone's (NY) existing anaerobic digester complex and its antiquated mixing and biogas systems presented one of the greater challenges of their recent $13M Wastewater Treatment Plant Improvements Project. The digester renovations included converting the existing secondary digester tank into a mixed and heated primary digester, installation of new fixed covers on each primary digester, construction of a new insulated glass lined-bolted steel secondary digester tank with a dual membrane "bubble" cover for gas storage, new dual-fuel boiler and split-flow heat exchanger, replacement of existing gas and supernatant piping, new biogas safety equipment and waste gas burner. This presentation will highlight critical aspects of the biogas system from design to construction, start-up, operation, and lessons learned. Design guidelines will be reviewed for sludge heating, biogas production, biogas pressure, piping selection, safety equipment, and instrumentation & control/SCADA systems for process control and trending. Examples of the project highlights include analysis and limitations of utilizing biogas for combined heat and power cogeneration at a municipal WWTP having an average daily flow of ~2.5 mgd; benefits of a dual membrane "bubble" cover for gas storage versus other alternatives; interaction of the various gas safety equipment components; and waste gas burner operation, and startup and maintenance procedures. The renovated facility has been in full operation for nearly 1-year with SCADA trending of gas production for process control and optimization. The presentation will review seasonal variations in gas production in relation to influent flows/loads, waste temperature, and operator's response to these changes. Lessons learned during start-up relative to setting system operating gas pressures will be discussed, as well as modifications made for improving sludge transfer flexibility between primary/secondary digesters.

8/29/2018, Room 206, 9:00:00 AM to 9:30:00 AM,

Presenter: Daryl O'Dell, Cornerstone, Tetra Tech, Daryl.ODell@tetratech.com

Title: Conversion of WWTP Digester Gas into Compressed Natural Gas Vehicle Fuel

Abstract: Utilization of the energy resource represented by digester gas from wastewater treatment plant (WWTP) anaerobic digesters can be an important contribution to sustainability of our communities. Historically, digester gas was converted to electricity and heat on larger WWTP projects with sufficient digester gas flows. Smaller WWTP projects with smaller flows often flared the digester gas. With changes in the electric markets, additional technologies that provide greater scalability can provide flexibility to maximize the technical and cost-efficiency of utilization of the biogas energy resource. One of those effective technologies is conversion of digester gas into renewable compressed natural gas (RNG) for vehicle fuel. This paper presents the technical aspects of converting digester gas to RNG and several case studies of recent projects that study and convert WWTP digester biogas into RNG vehicle fuel. Conversion of digester biogas requires capturing and cleaning the gas prior to processing it into vehicle fuel. Additional organic wastes can also be added into the digester to increase biogas production. Currently, the County of Kauai is undergoing a technical and economic feasibility study to evaluate the potential to produce RNG from the Lihue WWTP. The study weighs the end use for RNG as a vehicle fuel and as a fuel source for a peak power electric generator. The RNG options are also compared to electrical generation options. Another project to be highlighted will be the Las Gallinas Valley Sanitation District (LGVSD) project that is currently being designed with operation commencement scheduled for early 2017. The LGVSD system consists of a biogas conditioning system that will condition the gas for use in microturbines with the ability to further condition the biogas into RNG for use in LGVSD vehicles. The project is in California and was therefore available for numerous financial incentives to demonstrate the technology and its ability to provide clean fuel to the microturbines and vehicles. An update on the operation of the biogas conditioning system and gas pipeline for the Persigo WWTP in Grand Junction, Colorado will also be provided. The system started operation in early 2015. The Persigo system can produce approximately 500 gallons of gasoline equivalent per day of RNG from the WWTP digester gas, which is then piped nearly 6 miles to Grand Junction's existing CNG fueling station. The RNG is used to fuel a fleet of 30 vehicles, including City refuse trucks, dump trucks, transit buses, pick-ups and sedans as well as be available for sale to the general public. The project, the first its kind in Colorado, continues the City's movement toward a CNG-fueled fleet. The update will provide information on the savings in RNG fuel versus diesel fuel costs and the timeline for the paying off the system from the savings.

8/29/2018, Room 206, 9:30:00 AM to 10:00:00 AM,
Presenter: Brandon Gott, GHD, Inc., brandon.gott@ghd.com
Title: Dust Hazard Analysis and Thermal Dryer Design Safety Considerations
Abstract: Thermal sludge dryers are being used or considered at many wastewater treatment facilities to achieve biosolids volume reduction and generate Class A biosolids. This presentation will review thermal dryer safety considerations by examining case studies of two sludge dryer facilities. The first case study is a new thermal dryer installation at a municipal wastewater treatment plant, while the second case study is for the replacement of an existing thermal sludge dryer at another facility. In both cases, safety hazards associated with thermal dryer and combustible dust generation were reviewed. Recent standards for instance, such as the National Fire Protection Association (NFPA) Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids (NFPA 654), now require that a process hazard analysis (PHA) be conducted for processes handling bulk solids that present a fire or explosion hazard. In addition, hazard area classification should be an integral part of risk assessment to identify places (or areas) where controls over ignition sources are needed. These and other design safety considerations were utilized to determine site specific dryer system safety design features to reduce and/or eliminate potential hazards associated with the combustible dust generation equipment. As of 2012, there were more than 60 drying systems operating in the U.S. and more than 100 in Europe. As the number of sludge drying installations increase in the municipal market, Owner's and designers need to begin to give greater attention to safety in both the design and operation of these processes at municipal facilities.

8/29/2018, Room 206, 1:00:00 PM to 1:30:00 PM,
Presenter: Thomas E. Kochaba, HDR, tkochaba@hdrinc.com
Title: When Does It Make Sense to Put All Your Eggs in One Basket and When Does It Not: A Case Study of Biosolids Process Centralization
Abstract: A growing trend for municipal utilities within large metropolitan areas is to consolidate the biosolids stabilization process of multiple Water Resource Recovery Facilities (WRRFs) in a single facility. Examples of centralized biosolids facilities in the United States include New York City, San Antonio, Charlotte, Miami-Dade, Philadelphia, Ocean City (NJ), and Virginia Beach. There are several advantages to the centralization of biosolids stabilization facilities. Most notably, significant capital cost savings can be achieved by economies of scale. Other potential advantages of centralization include reduced footprint and staffing requirements, fewer permits, lower energy consumption, and fewer processes to manage. However, centralization can also bring on new challenges, such as reliance on a single technology or process, increased truck traffic, and less diversification of end products. In the case of facilities operated by a private operator, centralization can also result in an undesirable over-reliance on a single contractor. As a result, the decision to centralize requires consideration of the risks and is contingent on site-specific conditions and owner preferences. A case study is used to illustrate these points by presenting the results of the City of Baltimore Comprehensive Biosolids Plan, which evaluated various biosolids management alternatives, including multiple centralization options. Baltimore is an interesting case study for centralization, as its two WWTPs are only 10 miles apart. The presentation will present pros, cons, and costs of the biosolids management alternatives considered for Baltimore. Attendees will gain an understanding of how to weigh cost-savings with risks and other non-economic factors associated with centralization.

8/29/2018, Room 206, 1:30:00 PM to 2:00:00 PM,
Presenter: Stephanie Spalding, HDR, stephanie.spalding@hdrinc.com
Title: It Takes a Village: Collaboration to import technology to the United States for a cost-effective solids handling solution
Abstract: HRSD owns and operates the Atlantic Treatment Plant (ATP) in Virginia Beach, Virginia. Current crop restrictions and regulations associated with Class B biosolids restrict land application, resulting in the ATP storing biosolids anywhere from 90 to 225 days each year. The plant is approaching capacity for storing biosolids at its current average annual flowrate. This issue will be further exacerbated by the planned decommissioning of the Chesapeake-Elizabeth Treatment Plant (CETP) by the year 2021. As a result, costly additional onsite or offsite storage would be required in the future and created a challenge for HRSD to consider. The importance of finding a cost-effective solution led to the selection of thermal hydrolysis as a technology that would allow it to produce a high-quality, Class A biosolids product and to provide for future increases in solids handling capability without increasing digester capacity at the plant while also minimizing cake storage requirements, decrease the volume of dewatered cake by improving dewaterability, and improve product odor and stackability. This critical issue was solved through a collaborative process including assistance from HDR (Engineer), Crowder Construction Company (CM), and Cambi US, Inc. (Process Treatment Manufacturer). While Cambi already has an existing custom-built installation in the US, this project is the first North American installation of Cambi's standard modular B6-4 system, fabricated in the UK. This newer generation of thermal hydrolysis equipment is substantially different from the site-construction system of the current US installation. This presentation will review the unique aspects and challenges of importing the technology chosen for use in the US including: early procurement to maintain the project design schedule, commercial aspects of a multi-party assignment of a contract, meeting US equipment fabrication and code requirements, and advanced planning and coordination for technical reviews and manufacturing schedule to ensure that the overall project schedule was maintained. This presentation will also include lessons learned from equipment installation of the first , to occur in the Summer 2018.

8/29/2018, Room 206, 2:00:00 PM to 2:30:00 PM,
Presenter: Michael Olivier, Whitman, Requardt & Associates, LLP, molivier@wrallp.com
Title: Dewatering System Improvements at the Sod Run WWTP: Phase 1 Implementation Plan
Abstract: Harford County is upgrading their biosolids dewatering system at the Sod Run Wastewater Treatment Plant (WWTP). The Sod Run WWTP is a 20 MGD ENR facility with a modified 5 stage Bardenpho activated sludge process followed by denitrification filters. The plant utilizes primary solids fermenters to create a carbonaceous BOD feed into activated sludge process, enhancing Nitrogen removal. Waste activated sludge is thickened by gravity belt thickeners to 5% solids and pumped along with the fermented primary clarifier solids to anaerobic digestion. Currently the digested solids are temporarily stored 2-5 days and then dewatered by belt filter press (BFP). The dewatered biosolids range from 15 to 18% solids. BFP capture is low, around 85 to 89%. The biosolids are temporarily stored onsite prior to land application as a class B Bio-solids. The County undertook an extensive evaluation of dewatering alternatives and determined to move in the direction of Screw Press technology to replace the existing belt filter presses. Three (3) screw press manufacturers brought in pilot test units as part of the evaluation. Pilot test results indicated solids concentrations in excess of 25% with capture above 95%. Further evaluation has been completed and design is underway to replace the two oldest belt filter press units with a single screw press unit. The design includes an upgrade of the existing chemical storage and feed system as well as the replacement of two sludge feed pumps. The overall project also includes building upgrades including a new roof and enhanced ventilation system. The preliminary cost estimate is between $4.1 and $5.8M. This presentation includes a brief summary of the County's long term biosolids masterplan that includes future drying facilities and the decisions that led to the selection of the screw press technology and the associated chemical feed systems that will be implemented in the design.

8/29/2018, Room 206, 3:30:00 PM to 4:00:00 PM,
Presenter: Dian Zhang, Virginia Tech, dianz@vt.edu
Title: Using Cerium Salt As An Economical Precipitant for Struvite Control and Effective Dewatering of Anaerobic Digestate
Abstract: Struvite can form hard-crystalline deposits inside centrifuges and pipes during digestate dewatering and conveying, which causes operational problems and requires routine off-line maintenance. Following anaerobic digestion, the high concentrations of solubilized magnesium, ammonia and phosphate provides favorable conditions for struvite formation. In order to control struvite formation, one rational method is to reduce the dissolved phosphate below the level necessary to precipitate struvite out of solution prior to digestate dewatering. Traditionally, cationic metal salt such as iron (e.g. ferric chloride) and aluminum (e.g. alum) have been added to precipitate phosphate. However, these precipitants have their drawbacks in industrial application, e.g. iron can catalyze pellet silo fires and alum created deteriorated dewaterability of sludge. Therefore, cerium salt, namely CePO4, was evaluated in this study as a potential precipitant for phosphate removal. CePO4 is superior to other metal precipitants for its extremely low solubility (7.4 × 10-10 g L-1) within the typical range of digestate pH. Our study showed that cerium addition turned out to be more economically favorable for its high phosphate capture efficiency. Interestingly, cerium was also found playing similar role as cationic polymers by improving digestate dewaterability, leading to extra saving in cationic polymer dose. For this regard, effects of cerium addition on both phosphate precipitation and digestate dewaterability were experimentally investigated and mathematically interpreted in this study. It was concluded that cerium can be used as a robust precipitant for struvite control with additional benefit on dewaterability improvement of digestate.

8/29/2018, Room 206, 4:00:00 PM to 4:30:00 PM,
Presenter: John Maley, HDR, JRMaleyEngineering@gmail.com
Title: When Fastest is not Necessarily Best - Digester Startup Considerations for an Operating ENR Treatment Facility
Abstract: This presentation will detail key considerations of digester startup and how to address them (including a step by step example). Some of the considerations that will be discussed include safety precautions including purging oxygen from the digester headspace, minimum and maximum operating levels, seeding, biogas management, schedule drivers, side stream treatment factors, maintenance of plant operations, and transitioning from an existing solids system to digested sludge. An example case study will focus on the startup sequence developed for Howard County's Little Patuxent WRP Addition No. 8 Biosolids Improvements. The case study will detail the startup plan step by step beginning with the testing and checkout of critical systems and ending with a steady state digestion system. Some of the major intermediate steps include clean water filling and pressurizing for leak testing, purging sequence, feed and seeding strategy, sequence timing, sampling regiment, and preventative and corrective measures. The Howard County example is unique in that rather than producing digested sludge "as soon as possible", the start-up is being sequenced based on expected recycle flows. As an enhanced nutrient facility, the Little Patuxent WRP has both yearly total nitrogen (TN) limits and seasonal ammonia limits. The project team identified the ideal date to begin dewatering digested solids (and return higher concentration centrate to the head of the plant) to minimize impacts of the existing treatment process while complying with the discharge permit. The design and construction team worked proactively to provide efficient start-up and construction sequences to allow construction to proceed smoothly while maintaining effluent treatment requirements.

8/29/2018, Room 206, 4:30:00 PM to 5:00:00 PM,

Presenter: Christopher Moline, HDR, christopher.moline@hdrinc.com

Title: Optimizing Performance of a Centralized Thermal Hydrolysis and Anaerobic Digestion Process

Abstract: The Washington Suburban Sanitary Commission (WSSC) is implementing a centralized Bio-Energy Facility, which includes a thermal hydrolysis process (THP) and anaerobic digestion (AD) facilities at the Piscataway WWTP. The centralized facility will replace the current practice of Class B lime stabilization at all five WSSC WWTPs. Lab scale anaerobic digesters were operated to evaluate process performance and filtrate characteristics from blends of biosolids from the largest WWTPs. Performance was assessed in terms of multiple parameters including volatile solids reduction, effluent soluble COD, UV absorbance, dewatered cake solids, and polymer dose. Results showed lower than expected volatile solids reduction (~45%) and cake solids (22%), as well as high polymer dose, high UV absorbance, and high soluble COD. Given the financial benefits of improving the process metrics, further testing was warranted. Biosolids from the three largest plants were digested in batch methane potential tests both with and without THP, and one plant exhibited exceptionally low VSR (~30-35%). Possible reasons for the low digestibility include high solids retention time (>30 days), high aluminum content (~20 mg/kg), and low iron content (~4 mg/kg). Additional testing is underway to evaluate THP/AD performance with biosolids from individual plants and to investigate potential remedial actions. Three lab scale digesters are currently operating, each with thermally hydrolyzed biosolids from the three largest WWTPs. After reaching steady state, dewatering tests will be conducted to evaluate the dewaterability of the biosolids, the polymer dose, filtrate soluble COD, and metals concentrations. The plant with the lowest initial VSR will be modified at full scale, first to lower the SRT from >30 to 20 days, and then converting to ferric chloride for phosphorus removal in lieu of alum. The pilot digesters will be operated continuously to track the changes in performance. Results will provide guidance to other WTTPs that seek to optimize AD and dewatering performance while meeting low effluent nutrient limits.

8/30/2018, Room 201, 8:30:00 AM to 9:00:00 AM,

Presenter: Dave Lewis, Wachs Water Services, dlewis@wachsws.com

Title: A New KPI for Valve Operability Optimization

Abstract: Most water distribution systems are designed so that the average number of valves required for an isolation is three or four (the average is actually 3.7). If one or more of these valves can't be located, can't be accessed or doesn't work, isolations have to be "backed up" to find more operable valves. "Backing up" includes more valves, more customers, a larger footprint and takes more time—all which increases the consequences and costs of a failure.The City of Baltimore has proactively driven asset management into their system control program… by virtually "breaking" every pipe section, in their GIS, each month and comparing how many valves will actually be needed for an isolation (including the "backups" needed when valves are known to not operable—through the City's ongoing assessment program). The City prioritizes valve repairs that create the biggest improvement in isolation plans… investing in the repairs that deliver the biggest reduction in isolations -- in order to reduce the consequence of failure and invest in repairs that have the highest impact.This presentation will review the advanced approach taken by the City of Baltimore in prioritization and control of their water distribution system.

8/30/2018, Room 201, 9:00:00 AM to 9:30:00 AM,

Presenter: Derek Wurst, Black & Veatch, wurstdm@bv.com

Title: They Don't Build Them Like This Anymore: Facility Condition Assessment

Abstract: The era of the clean water act (CWA) in the 1970s can be viewed as a golden age in water and wastewater treatment. The influx of federal money caused a building boom in the industry. However, facilities built at this time are showing their age. Deterioration of public infrastructure is reducing asset value and makes these facilities susceptible to failure. Recent industry focus on asset management principles and a paradigm shift of having to do more with less has placed increasing emphasis on performing condition assessments to determine remaining useful life and to develop capital improvement plans focused on rehabilitating existing facilities. Within the industry, the focus has been to preserve infrastructure by making prudent decisions based on good intelligence. Decisions based on risk consider both consequence and likelihood of failure. A facility condition assessment will help to determine the likelihood of failure as it relates to mitigating a facility's exposure to risk. As part of this discussion, participants will identify techniques for establishing an approach to facility assessments such as prioritizing by process criticality, understanding differences between static and dynamic risk criteria including industry practices for assigning condition ratings. Comprehensive facility condition assessments are often conducted with a multi-disciplinary team. As such the evaluation needs to consider specific methodologies for the various disciplines while balancing the objectives of the overall condition assessment program. Specific examples from recent and local projects will demonstrate how to establish rating systems including how to distinguish between condition and performance based evaluations. Techniques for physical inspections will be presented highlighting some of the recent technological advancements for performing non-destructive evaluations of in-service facilities. Concluding information will provide guidance on how to use condition assessment data to make actionable recommendations that are clearly presented and organized by expenditure type and prioritized based on mitigating risk.

8/30/2018, Room 201, 9:30:00 AM to 10:00:00 AM,

Presenter: Jason Garz, Mott MacDonald, jason.garz@mottmac.com

Title: Mitigating Risk When Creating a Pressure Zone with a New Elevated Tank, New Pumps, and Really Old Pipes

Abstract: The DC Water distribution system contains eight pressure zones supplying 100 MGD of water to its customers. DC Water began the planning process to implement a ninth pressure zone nearly 20 years ago and has spent nearly $100M on projects to improve system pressures for approximately 6,000 customers. As the date for commissioning the new zone approached, an extensive and detailed risk mitigation plan was implemented to minimize disruption to this large portion of the DC Water distribution system. The mitigation plan involved reviewing operational status and re-commissioning key assets within the new pressure zone, both newly constructed and older facilities expected to function under the higher pressures. The CIP projects implemented by DC Water to allow creation of the new zone included: 1) Anacostia Pump Station Reconstruction, 2) New Transmission Main Construction, 3) Distribution Main Replacement in higher pressure areas, 4) New Elevated Tower Construction, 5) Tower Mitigation Coordination with Public Stakeholders, 6) Residential Pressure Reducing Valve Installation. The zone commissioning and risk mitigation process was developed to verify that system components perform per the design intent and DC Water operational requirements to provide a smooth transition and mitigate risks to maintain the public's confidence and limit service disruption. Some of the largest challenges involved with creation and commissioning of the new pressure zone included: 1) While the pump station was constructed years ago, the pumps for the new pressure zone have not been operated at their design point since the station was constructed, 2) DC Water contracted with a local plumber to provide and install pressure reducing valves inside the homes of 1700 residential customers that will experience pressures above 80 psi following creation of the new zone, 3) Extensive public outreach, 4) Schedule commitments made to government agencies for completion of new zone.

8/30/2018, Room 201, 11:00:00 AM to 11:30:00 AM,

Presenter: Tatiana Baranova, DC Water, Tatiana.baranova@dcwater.com

Title: Potomac Interceptor Inspections

Abstract: Introduction. The Potomac Interceptor (PI) is one of the most critical sewer pipelines in the District of Columbia's Water system due to its inherently high Consequence of Failure based on its size (24 inches to 13 feet), and proximity to the Potomac River.Background. The Potomac Interceptor is a 40 mile long sewer that conveys 60 million gallons per day of wastewater from Dulles International Airport to Potomac Pump Station. The PI Serves Dulles International Airport, Fairfax County, VA, Loudoun County, VA, Montgomery County, MD and the Town of Vienna, VA. The condition of the PI was first assessed in 1999, and more recent inspections were completed between 2011 and 2014. Significant corrosion has been observed in many of the pipe segments, including some where the rate of corrosion has caused the defect level to progress from sound condition to heavily deteriorated in just 10 years. For this reason, engineers recommend that the entire PI be inspected at a minimum every 10 years, and even more frequently for segments with significant corrosion. Poor video quality, or no visual inspection has made it difficult to accurately assess the condition of some segments. However, it was possible to prioritize the inspection where engineers assigned a condition score to each pipe segment of the PI based on the available inspection information.Methods. Based on the recommendations of the previously completed inspections, the next phase of the Potomac Interceptor Sewer Inspection has been developed. The scope of this project includes inspection of 79,620 linear feet, including 4,200 lf of sewers in critical locations that have never been visually inspected. These critical locations include downstream/upstream of MH-6, a manhole that has surcharged into C&O Canal twice in spring 2014. In addition to inspection, this contract also includes the heavy cleaning of 2,500 lf of sewers on Dulles International Airport property that are known to contain significant quantities of debris. Due to the difficulty of access along the Potomac Interceptor it was recommended to include some segments adjacent to the priority 1-4 pipe segments that meet the following criteria: pipe segments that connect to the PI mainline (observed high corrosion rate), and pipe segments that have not been inspected since 2010-2011. This project has been scheduled to be completed in the summer which will mitigate the likelihood of diminished CCTV quality caused by steam. Several locations where severe defects were observed, including missing aggregate and holes, were not recommended for rehabilitation due to budget constraints. Alternatively, these segments have been assigned for a shorter inspection cycle in order to monitor the progression of corrosion. Results. A comparison with the Asset Management Program's Risk Criteria reveals that over 60,000 linear feet of the sewers included in this contract are either High, or Highest Risk.Conclusion. It is recommended that DC Water move forward with this project to continue to collect more information on defects associated with hydrogen sulfide corrosion, and to minimize the risks associated with a catastrophic failure.

8/30/2018, Room 201, 11:30:00 AM to 12:00:00 PM,

Presenter: Mert Muftugil, GHD, Inc., mert.muftugil@ghd.com

Title: Asset Management Wins aren't Everything, They're the Only Thing – Implementation Success Story at the NEW Water's Green Bay Facility

Abstract: The project aims to: 1) Meet the strategic goal of preparing asset inventory for entry to the maintenance system; 2) Establish a process to assess and update asset information regularly; and, 3) Support long-term capital and maintenance asset renewal decisions. These goals align with the objective of the asset management program, which is the optimization of asset lifecycle (balancing cost, level of service and risk of asset failure). The approach is based on the EPA's framework, which uses a 10-Step Process to answer five core questions: What is the current state of our assets? What are our performance requirements and levels of service? Which assets are critical to sustaining performance? What are our best capital and O&M investment strategies? What is our best long-term funding plan? The initial part of the work focused on defining the framework for condition, criticality, risk, and performance assessments, followed by the application of the proposed framework around a small pilot area - the influent pumping station was chosen as the pilot area as it has a comprehensive blend of assets that would be found in other parts of the Green Bay Facility, which receives 30 mgd flow from 18 nearby municipalities. While implementing the proposed framework around the pilot area, past similar work performed at other NEW Water facilities were aligned so comparisons and asset investment prioritizations can be made across the organization in the future. The approach is focused on implementing a strategy that will be sustainable within NEW Water. To achieve this, NEW Water will use the following three guiding principles: 1) "Fit-for-Purpose" – make sure that what we do is appropriate for us and not implement a "one-size-fits-all" framework; 2) Our consultant and staff will work collaboratively in developing the best implementation strategy to efficiently leverage existing work and knowledge; 3) Develop the program so that asset management knowledge is transferred from our consultants to our staff throughout the project. The proposed presentation will present the results and include: 1) Development of the framework elements and their implementation; 2) Alignment of past condition, criticality, performance, and risk assessments with the framework elements developed as part of this project; 3) Asset register summary statistics - at the time of the development of this abstract, the asset register contains 3,440 assets; 4) How NEW Water will use condition assessment protocols to estimate remaining life; 5) Asset field data collection with tablets for upload into Maximo maintenance management system; 6) How risk is being used to prioritize needs and how tolerable risk is being considered in the decision-making framework; 7) How Management Strategy Groups are being used as a basis to model "what-if" scenarios for different capital, operational and maintenance management strategies; 8) Content and structure of the Asset Management Plan that has been developed as "fit-for-purpose"; 9) Needs and future investment requirements identified using Decision Support System analysis; 10) Generating capital and maintenance investment prioritization buckets as a function of asset risk, criticality, and condition ratings; 11) Lessons learned and next steps.

8/30/2018, Room 201, 12:00:00 PM to 12:30:00 PM,

Presenter: Andrew Filippi, Arcadis, andrew.filippi@arcadis.com

Title: Establishing Pipe-by-Pipe Rehabilitation and Reinspection Schedules using Years Remaining Service Life

Abstract: Many sewer asset management plans function at the 10,000 foot level, providing broad guidance to rehabilitation needs, but failing to specify exactly when to rehabilitate which pipes, when to partially repair versus holistically rehabilitate or replace, and which technology offers the best life cycle cost for a given pipe segment. Arcadis developed a method to do this using the Town of Sullivan's Island, South Carolina sewer system as full-scale proof of concept. Central to the decision matrix logic is the concept of Years Remaining Service Life (YRSL). This concept starts with the assumption that a pipe is serviceable until it collapses. The structural defects and their predicted worsening rate determines the Years Remaining Service Life (YRSL). The more defects, and the more severe the defect, the lower the predicted YRSL. YRSL can be improved by repairing or rehabilitating some or all of the defects on a given asset. Deciding which defects to repair, when, and with what technology, represents an actionable asset management plan. The variety of sewer pipe rehabilitation technologies on the market gives engineers and system owners multiple options for rehabilitating deteriorating sewers. Each technology has certain strengths, costs, longevity, and defect applicability that make them suitable for only certain pipe conditions (e.g., defects, depth, location, number of taps). Because sewer pipe defect conditions are highly localized, using all the available rehab technologies at one's disposal on a defect by defect and pipe by pipe basis reduces the overall price of rehabilitation. This same thinking can also be applied to the optimize reinspection frequency to prevent potential loss of pipe service before deferred pipeline rehabilitation can be completed. By implementing multiple rehabilitation technologies and determining which technology to use on a pipe by pipe basis by prioritizing YRSL, the capital program cost was optimized, and a 25-year pipe specific reinspection frequency program was laid out. System rehabilitation costs during the year 50 to year 60 life of the system was reduced by approximately 75% from its original generic risk-based asset management rubric. Using this pipe-based method, only 8% of the 50-year old system was found to require action within 5 years, with 85% of the system found to have >25 YRSL, and fully 56% have >40 YRSL. Both the capital rehabilitation and the pipe reinspection were programed into the utility's GIS-based work order system and the costs inserted into both the long-term and short-term CIP programs/budgets.

8/30/2018, Room 201, 2:00:00 PM to 2:30:00 PM,

Presenter: Charlie Card, GHD, Inc., Charles.Card@ghd.com

Title: Plymouth, MI SAW Grant Asset Management Plan – Doing it right!

Abstract: The Charter Township of Plymouth (Township) has received a Storm water, Asset Management, and Wastewater (SAW) grant for developing an asset management plan for the Plymouth Township wastewater collection system, which consists of 160 miles of sanitary sewers, 3,900 manholes, and one pump station. Utilizing advanced geospatial and data analytics, the Township, has developed an effective business process to sync seamlessly in-field condition assessment, computerized maintenance management system (CMMS) procurement, and hydraulic model development while developing a compressive risk-based asset management plan. Plymouth Township goal of the Sanitary Sewer Asset Management Plan (AMP) is to identify the most cost effective method for maintaining their wastewater system at the appropriate level of service, while also implementing a robust AMP to move from reactive maintenance to predictive maintenance and to minimize the risk of failure of critical components. The Sanitary Sewer AMP being developed will document short term and long term investment needs for successful operation of the wastewater system while also minimizing operational costs through a robust CMMS system to efficiently plan and conduct infrastructure maintenance work. Through a series of workshops conducted with Township's staff, spanning across divisions from human resources to field operations, current infrastructure management processes and practices were reviewed and assessed to provide a baseline for the Township's asset management strategy. Identifying asset management process gaps, the Township's practices were ranked against what is generally regarded as industry leading practices built upon many AM processes, practices, techniques and tools developed over the past several decades to establish the current state of asset management maturity for the Township. The focus of this technical presentation will be to outline the process of developing the asset implementation framework that is being used to guide the development of the Sanitary Sewer AMP. This is a critical step that is often overlooked and thus resulting in plans and procedures that "sit on the shelf". The framework includes a both tactical asset management practices (e.g. condition assessment, risk analysis, management strategies, levels of service) and strategic asset management elements (e.g. training, asset management policy, organizational considerations).. When implementing the CMMS system, the Township will incorporate the business risk associated with each asset, providing a comprehensive system to prioritize and manage work orders.The Township's management and staff will have an increased overall awareness on asset management principals and will use these principals to develop management, operations, and maintenance procedures.The Finalized Asset Management Plan will be a living document that will be used to identify capital and O&M investments, including identifying replacement, renewal and repair strategies. The Township has taken an one-of-a-kind approach to develop and implement a Sanitary Sewer Asset Management Plan (AMP), using the best practices, including the US EPA's framework, while also performing asset condition assessment, CMMS procurement, and Hydraulic Model Development. This AMP will be providing a risk based management of assets contributing to: a) cost savings, b) more transparency for project needs, c) projection of short and long-term investment needs, d) improvement of daily operations activities.

8/30/2018, Room 201, 2:30:00 PM to 3:00:00 PM,

Presenter: Bob George, Tetra Tech, bob.george@tetratech.com

Title: Clouds & Things: The implications of Cloud and Internet-of-Things for SCADA/ICS

Abstract: The increasing need to share data, along with the plummeting costs of processor power and bandwidth is opening up new opportunities for expanding the reach of SCADA/ICS networks, while simultaneously introducing significant new risks. This presentation introduces key technologies that are impacting SCADA/ICS network planning, with serious future implications. This presentation will focus on three fast-growing and emerging technologies: Cloud Computing and the Internet of Things (IoT). Each technology will be reviewed and contrasted with traditional SCADA/ICS communications technologies. The relative strengths and weaknesses of each will be compared in terms of: * Cybersecurity * Reliability * Performance * Cost This presentation will explore options for improving the security and reliability of these technologies, and identify criteria that can be used to determine if the risks of using these technologies can be mitigated to acceptable levels for a given organization. Topics will include: * Overview of Cloud Computing * Overview of Internet of Things * Costs and Benefits * Cloud and Fog * Big Data and Analytics * Containers and Microservices (Anything as a Service - XaaS) * Mobility and Security * Comparison of protocols and performance requirements * Industrial Internet of Things * Smart Grids/Smart Cities * Cyber-Physical Systems * Cybersecurity

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8/30/2018, Room 201, 3:00:00 PM to 3:30:00 PM,

Presenter: Prasad Manthena, Greeley and Hansen LLC, pmanthena@greeley-hansen.com

Title: Sewer Tunnel System integration into Enterprise Asset Management

Abstract: DC Water's DC Clean Rivers (DCCR) Project the 25 years, 3.5 Billion dollar project undertaken as part of a consent decree for reduction of Nitrogen, reduction of CSOs and flood relief within the District includes a system of tunnels to capture combined sewer flow. The accelerated part of the project included construction of First Street Tunnel (FST) to address flooding issues associated with combine sewer overflows within the Bloomingdale Community. The DCCR Asset Management Program had as one of its primary focus to integrate the new tunnel system into the existing DC Water Enterprise Asset Management Systems comprised of GIS system for spatial management and Maximo system for physical asset management. Integration into existing Enterprise Asset Management system included assessing the existing Enterprise Asset Management Systems and its reuse before creating any asset classes to avoid redundant and excessive amount of classes in the system. Key aspects of this included DCCR to identify the asset management framework foundation upon which the tunnel assets will be integrated. Subsequent steps were to work with core-team in the development of new asset class definitions and asset attributes, Geographic Information System (GIS) to Maximo mapping, tunnel system asset lifecycle process development, work flows development, GIS scripts, Maximo test cases development, and development of a Concept of Operation Plan (CONOPS) for documentation of the integration process. For the new tunnel system, the shallow assets such as diversion chambers are similar to structures that currently exist within DC Water's collection system. Whereas the deep assets like tunnels, adits and shafts are new components. Existing system for linear assets in the Enterprise do not have a business process for this approach. This provided us an opportunity during integration to create new business process such that DC Water is able to utilize Maximo for entire linear system including the tunnel assets. The asset management team conducted workshop meetings with each operation departments at each stage of development to gain consensus. This allowed for straightforward transition, asset management, and utilization of work order system once the systems was fully transferred to DC Water Operation Departments. Additionally, the use of existing asset class definitions and attributes as part of the integration provided for familiarity for the operations staff. The software integration of the asset types followed and were completed prior to the end of warranty period of October 2017 on the facility. The streamlined approach to the asset integration of the FST assets was a successful collaborative effort undertaken by DCCR asset management program. The phased approach and collaborative processes successfully gained buy-in from operational stakeholders through workshop meetings, was a step crucial to the success of the project. Additionally, using the existing asset class definition and attributes added familiarity for the operators and helped expedite the process. Finally, the development of the CONOPS provided a framework that will be applied as the other tunnel segments of the DCCR project are commissioned.

8/30/2018, Room 201, 4:00:00 PM to 4:30:00 PM,

Presenter: Alireza Parahmi, DC Water, Alireza.Parhami@dcwater.com

Title: 5 years of Pipeline Condition Assessment Program at DC Water – Lessons Learned from the Tools and Technologies Employed

Abstract: What do you do when there are too many choices, and not enough time to research the best product to buy? You find someone else who has already done the comparison research. This presentation will provide information on a multitude of water main condition assessment tools and technologies. Maintenance of aging water pipeline infrastructure is a major challenge for the world's water industry and can be very costly. DC Water's water transmission and distribution system is composed of 1,300 miles of water mains up to 84-inches in diameter. Of those, 230 miles are 16-inch diameter and larger. Cast iron transmission mains remain a substantial component of transmission water mains, and many are over one hundred years old. Although these pipes were overdesigned at the time of installation when compared to today's standards, they are deteriorating over time due to corrosion and other factors. Ductile iron, steel, and concrete pipes are also present in the system and have their own deterioration mechanisms. But one thing is common to all - repairing of transmission main breaks can be time consuming, expensive, and very disruptive to the community. DC Water manages the lifecycle of the linear assets within a well defined Asset Management framework. Transmission water mains are prioritized for inspection and condition assessment by Asset Management, and DC Water has the internal goal of inspecting 5 miles of transmission mains per year. Given the many tools available in the market to conduct pipeline condition assessment, the water utility typically wonders what tool to select to inspect a specific asset. To date, DC Water has employed multiple inspection and condition assessment technologies over the years. Factors such as pipe diameter, pipe material, pipe location and accessibility to deploy the tool whether internally or externally, available budget to inspect the asset, and ultimately data quality and resolution play a role in selecting an adequate pipeline condition assessment tool. This presentation will include: Description of different PCA tools employed at DC Water, Benefits and constraints of using the different tools, Data quality and assessment results, Lessons learned during planning and execution of the assessment, and Condition assessment costs organized for budgeting future assessments

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8/30/2018, Room 201, 4:30:00 PM to 5:00:00 PM,

Presenter: Madeleine Driscoll, KCI Technologies, Inc., madeleine.driscoll@kci.com

Title: Using Technology to Turn Tacit Knowledge into Explicit Knowledge

Abstract: Background information An aging workforce is a reality that most organizations have to plan for as a generation enters retirement. Without adequate succession planning, the knowledge accumulated during their careers will leave with them. This presentation will tell the story of a (semi-fictitious) long-term employee that retired with over 40 years of knowledge about the water system valves in a large utility. "Vince" began working with the local utility upon graduating from high school, which was very common amongst his peers. Advanced education and certification were not as common as they are today. His on-the-job experience, coupled with a photographic memory made him a subject matter expert. Off the top of his head, he knew turn count/direction, valve type, direct buried versus vault, etc. While some of this information could be found on drawings, it required others to have the paper maps, which aren't always readily available. When Vince announced his retirement after 40 years of service, it did not come as a surprise. Unfortunately, a succession plan was not in place. The valve crews continued working, but the expert was no longer there to provide guidance. As a result, mistakes were made and inefficiencies started creeping in. Examples include: inadvertently putting customers out of service by turning a valve on the wrong water main, over torquing valves, not being able to locate a valve during an emergency due to snow/ vegetation/ debris cover, and leaving valves inappropriately closed because they are counterclockwise turning valves. Technology Solution In 2011, KCI developed a web-based application to document operational data captured during valve exercising. In essence, the purpose of the application was to turn tacit knowledge into explicit knowledge by requiring the valve crews to input basic information when performing work. The application provided the history of the valve and aided in shutdowns by performing a network trace, accounting for any inoperable valves, and returning an execution plan. Over time, the application will contain operational attributes for every valve in the system that can be leveraged to make asset-level investment decisions. Application Functionality & Benefits The presentation will provide the audience with enough information about the application's functionality to understand how it provides lifecycle management benefit to an organization. When a valve is operated, the application generates a new record indicating date of operation, turn count/direction, max torque, operator name, condition rating, and maintenance requirements. The presentation will include relevant screenshots to better understand the ease and format in which data is entered. While it will take years to populate data for all valves, it has already proven to be a useful tool. For the operators, it helps minimize errors previously described, notifies them of inoperable valves, and provides a list of affected customers in advance of a shutdown. In addition, the valve database is leveraged by engineers when designing capital projects as they can see if an operable valve is going to impact their shutdown and what valves should be replaced in conjunction with a water main renewal project.

8/30/2018, Room 201, 5:00:00 PM to 5:30:00 PM,

Presenter: Anthony Dowell, AECOM, anthony.dowell@aecom.com

Title: Using GIS and Innovative Technologies for a Proactive Approach to Identifying, Analyzing, and Managing WSSC's Exposed Sewer Assets

Abstract: With over 5,500 miles of sanitary sewer pipeline located throughout Prince George's and Montgomery Counties, including a considerable amount of pipeline located within stream valleys and hundreds of stream crossings, exposed sewer assets are a growing concern for WSSC. The high level of urbanization within the WSSC service area leads to dynamic waterways that are subject to extreme fluctuations in flow, providing challenges in managing these exposed assets and meaning that rehabilitation, stabilization, or relocation efforts often do not take place until there is a failure or an imminent threat of failure. In 2016, AECOM began a four-year, Consent Decree driven Trunk Sewer Inspection & Surveying project with the Washington Suburban Sanitary Commission (WSSC). Under this project, AECOM was tasked with locating, surveying and analyzing exposed sewer assets within the WSSC service area, with an emphasis on assets within and along waterways. Using a combination of historical records, WSSC's water and sewer GIS data, and a variety of environmental datasets, AECOM used a desktop-based approach to identify assets with a high risk of exposure based on proximity to major and minor waterways, topography, soil classifications, and geology, which was used to prioritize the efforts of field crews tasked with conducting "stream walks" in an effort to find exposures. Exposed assets that are located in the field are surveyed with high accuracy GPS (capturing the upstream and downstream limits of the exposure) and data is collected in accordance Stream Corridor Assessment Survey (SCAS) protocols. As exposed assets have been identified and surveyed in the field throughout the project, AECOM and WSSC have worked together to select high priority sites for further analysis. This has included the initiation of a pilot study that has used two approaches to monitor these selected assets over the course of several years in an effort to track changes to the exposures and help to prioritize repair, replacement or relocation efforts. This includes quarterly visits to each site to collect new data, as well as intermediate visits that are triggered by significant storm events. To perform this monitoring, AECOM has worked to establish datums for each exposed asset site that are used to produce accurate and reproducible cross section and pipe measurements during each visit during the monitoring period. For selected sites with the appropriate conditions, terrestrial-based Lidar scanning is being used to capture high-resolution point cloud data that is suitable for 3D spatial and temporal analysis using GIS software. This approach is capable of measuring very small-scale changes to sites due to erosion, and produces highly accurate data that can be tied into existing survey monuments or can be captured in a relative datum. This presentation looks to outline the approaches used to identify, catalog and monitor exposed assets, and to share results and lessons learned throughout this study.

8/30/2018, Room 202, 8:30:00 AM to 9:00:00 AM,

Presenter: Ufuk Erdal, AECOM, Ufuk.Erdal@aecom.com

Title: Can MBR Reduce or Eliminate Need for Addition Disinfection–Case Studies

Abstract: Membrane bioreactors (MBRs) combine secondary treatment and solids separation in one system that produce high quality effluent with virtually free of solids. Coupled with widely used biological nutrient removal (BNR) technology, MBR can meet stringent effluent total nitrogen (TN) and total phosphorus (TP) limits, especially where site space limitations force a compact footprint design. There are increased numbers of reclaimed water applications where an MBR system is coupled with a UV disinfection system. UV disinfection used in water reuse applications in California, Nevada and Texas typically follows National Water Research Institute Guidelines (NWRI, 2012). Per NWRI, UV disinfection systems coupled with MBR or low pressure tertiary membrane filtration are designed to meet 5-log inactivation of poliovirus using UV design dose of 80 mJ/cm2 and design UV transmittance of 65 percent. The disinfected water should satisfy effluent fecal coliform of no higher than 2.2 MPN/100 mL as 30-day geometric mean and 23 MPN/100 mL as daily maximum. Sampling of MBR permeate at operating reuse facilities frequently demonstrates that no coliform bacteria are present because of excellent rejection of bacteria through the membranes. In addition, virus studies conducted at reuse facilities also indicated substantial virus removal (0.5-log to as high as 6 log removal) depending upon virus types used, pore sizes of membranes and characteristics of membranes utilized in MBR systems and MBR design and operating conditions. As a result, many utilities ultimately ask why stringent disinfection requirements are needed because reclaimed water pathogen limits are mainly met through MBR alone. The energy use and associated cost for UV disinfection may be an impetus for some facilities to contemplate turning their UV reactors down to a lower operating dose setting without compromising regulatory compliance. Thus, there is a “disconnect” between the bacterial discharge limits that address disinfection and the implicit regulatory goals for reuse disinfection. In this study, a comprehensive pathogen testing and monitoring plan was implemented in two full scale MBR/UV disinfection facilities. The objectives of each study were to determine virus removal capabilities of the MBR and UV disinfection systems to address this “disconnect” at each facility and develop operational treatment goals that protect public health while reducing or eliminating UV usage following MBR to minimize energy usage in the reclamation facility. To meet the study objectives, first, a set of sampling campaign was initiated to select viruses for sampling (Phase I). The virus types selected for each study included: Human Adenovirus, MS-2 Coliphage (MS-2), Somatic Coliphage, Norovirus G1, and Norovirus G2. Bacteria samples included total and fecal coliform. Second, sampling and monitoring plan executed to determine virus removal capabilities of the MBR/UV trains under four different operating conditions (Phase II): (1) Normal Operating Conditions (design SRT, design flux and design UV dose of 80 mJ/cm2); (2) Normal Operating Conditions with the Clean Membranes; (3) Operating at Increased Membrane Flux and (4) Normal Operating Conditions with Lowered UV Dose. The paper manuscript will summarize study findings and provide valuable information for agencies that are interested in water reuse.

8/30/2018, Room 202, 9:00:00 AM to 9:30:00 AM,

Presenter: Ned Talbot, OBG, ned.talbot@obg.com

Title: At the Mercy of the Process – Impacts of nitrogen removal performance on WWTP Disinfection

Abstract: Nutrient removal programs in the Chesapeake Bay region over the last two decades have focused on advancing nutrient removal. However, other aspects of the plant are impacted by the biological processes introduced while trying to remove nitrogen species, as well as phosphorus. Improvement in disinfection was a secondary component of a recent 3.0-MGD WWTP replacement project. However, it is a critical component in meeting the plant’s NPDES permit. And, since chlorine based, disinfection is affected by nitrogen removal performance of the MBBR systems upstream. This presentation will provide an overview of the fundamentals of chlorination and dechlorination, as well as breakpoint chlorination, detailing how nitrogen species can affect chemical dosing and disinfection performance. It will then review an example of a plant that exhibited some disinfection performance issues prior to an advanced nutrient removal upgrade, which were exacerbated during startup of the new facility. The secondary treatment and disinfection components of the new plant upgrade will be presented, including the CFD modeling performed to refine missing improvements to the chlorination tanks. Critical steps that were taken to regain consistent disinfection performance after startup of the new MBBR nitrogen removal systems will be highlighted. Disinfection instrumentation and control will also be discussed. The new plant originally incorporated chlorine residual sampling, but decided to change to insitu ORP measurements to help improve chemical dosing response time and reduce chemical usage. The fundamentals behind ORP measurements and the results of implementation of the new instrumentation and control system will be presented, including lab data and operator experience with the new equipment.

8/30/2018, Room 202, 9:30:00 AM to 10:00:00 AM,

Presenter: Caroline Nguyen, WSSC, caroline.nguyen@wsscwater.com

Title: Expanding Resource Recovery at WSSC

Abstract: The wastewater industry is moving toward resource recovery, and away from focusing solely on permit compliance. This presentation will share where WSSC wastewater facilities are at; recommendations and evaluations of resource recovery opportunities for WSSC; and the key initiatives that are moving forward now to recover more nutrients, energy, and water. The on-going efforts aim to expand the resource recovery achieved by the facilities, supplement the future Bio-Energy facility at the Piscataway plant, and align WSSC to be the world-class utility. To prioritize initiatives, WSSC staff compiled energy and chemical use data, conducted BioWin process modeling, developed complex operating cost estimates accounting for the future Bio-Energy facility, and completed a literature review. The highlights will be briefly summarized. One of the ongoing evaluations is the feasibility and testing of Enhanced Biological Phosphorus Removal (EBPR) at WSSC's five major wastewater plants to potentially reduce operating costs and position WSSC to recover phosphorus in the future. The latest findings will be shared. The addition of primary treatment at one of WSSC's plants is also being considered; preliminary bench-scale testing results and other information about the evaluated technologies will be summarized. Other recommendations and projected timeline for the future path for WSSC's wastewater facilities will also be shared.

8/30/2018, Room 202, 11:00:00 AM to 11:30:00 AM,

Presenter: Kristin Waller, OBG, kristin.waller@obg.com

Title: Don't Freeze: The Expedited Winter Startup of a 17 MGD IFAS WWTP

Abstract: While the use of suspended plastic media in biological nutrient removal (BNR) systems like Integrated Fixed Film Activated Sludge (IFAS) can provide a protective surface for microorganisms to grow and thrive at lower temperatures and varying flow rates, the initial wetting process to integrate the media into the basins can take one to two weeks, and growth of nitrifiers may take up to five weeks to fully stabilize initially under optimum conditions. This process can become even more complicated when scheduled for the cold winter months. This presentation will review the winter startup of a 17-MGD Design ADF IFAS WWTP retrofit, with a tight construction schedule. With a looming 1 mg/L TP permit limit and various construction delays, the WWTP owner, contractor, IFAS provider and design engineers of this project worked together to expedite the initial tank startup process resulting in a mid-winter schedule. While winter construction is normal, the project experienced some unique constructability issues were observed. For instance, winter wind patterns required a modification to media addition approach to mitigate risk of media loss. In addition to constructability issues, this presentation will also review plant performance of the temporary treatment scheme during startup, which includes one retrofit IFAS bioreactor, and one of the plants existing biological trains (including two roughing filters and an oxidation ditch). Given schedule limitations, waiting 5-days for a typical BOD5 test result to confirm treatment would mean additional slippage behind the already constricted project schedule, so surrogate COD analyses were utilized as a part of the performance evaluation.

8/30/2018, Room 202, 11:30:00 AM to 12:00:00 PM,

Presenter: John Revette, Wendel, jrevette@wendelcompanies.com

Title: Never Stop Optimizing: Start Planning Now on How to Pay for Your BNR and ENR Equipment Replacement Projects

Abstract: Some BNR upgrades in the region are approaching 20 plus years in service and some ENR upgrades are approaching 10 plus years in operation. Waiting until this equipment fails to start thinking about replacement would be a mistake. Instead of looking at pending equipment replacement projects with dread, look at them as an opportunity to optimize your wastewater treatment plant (WWTP) processes. By optimizing WWTP processes, we can find better and more creative ways to pay for capital projects without the burden being borne by the rate payers. The Chesapeake Bay Initiative resulted in the majority of the regions WWTPs being upgraded for nutrient removal. The nutrient removal processes were capital-cost intensive and many have high operations and maintenance (O&M) costs. Many facilities were constructed with expectations of growth never realized resulting in oversized systems and inefficient equipment. Other facilities were installed with the best technology at the time, which in many cases may have been first generation equipment models. Some facilities were not provided with adequate operational control to allow real time operational changes. Manual operations for controlling air, dosing chemical, or controlling filter backwashing, are a few examples of operations that may be causing higher than necessary costs. How are municipalities going to be able to afford equipment replacement projects into the future? The answer is to develop a plan of attack with a new tactic in your toolbox: Integrated Capital and Energy (ICE) planning. ICE is a method of capital planning taking a holistic approach, evaluating the individual capital projects you need to complete to continue to meet your permit requirements. This approach is through the lens of energy efficiency and optimization opportunities to help fund the projects. The approach recognizes energy efficiency and operational improvements can result in cost savings, freeing up operational funds, and making the improvements fiscally more feasible. In evaluating needed facility repairs, the ICE approach balances life cycle cost optimization with the triple bottom line approach. This approach balances environmental, social and economic factors to create a holistic solution for rate payers. Many WWTP's have benefited from Integrated Capital and Energy planning. Each of these plants enhanced energy efficiency and the economic performance of their facilities, and were able to capitalize on grants and incentive programs to help defray the capital improvement costs. The improvements not only helped these municipalities or agencies save money, they allowed them to move into the future on a more solid, sustainable basis. This presentation will provide a case study of ICE plans for WWTPs, analyzing how energy efficiency and process optimization opportunities can be identified and integrated into capital planning to facilitate needed repairs and control on-going operating costs. At session conclusion participants will be able to: recognize how optimization of your WWTP integrated with energy efficiency and operational improvements can actually pay for asset renewal. Also participants will learn about life cycle cost optimization and the triple bottom line approach.

8/30/2018, Room 202, 12:00:00 PM to 12:30:00 PM,

Presenter: Lenny Gold, MCET, lgold@goeaston.net

Title: Lessons Learned: Based on case studies of process optimization projects at ENR Wastewater Treatment Facilities.

Abstract: The Maryland Center for Environmental Training (MCET) provides free technical assistance (TA) to Wastewater Treatment Facilities (WWTF) generally designed for less than 5.00MGD. This program is supported by funding from the Maryland Department of the Environment (MDE). The main focus of this program is to provide on-site TA to O&M staff at WWTF's. Over the past 10 years the main emphasis of this program has been on assisting ENR facilities to optimize their process control programs in order to consistently meet the stringent nutrient removal requirements established by MDE. In accomplishing these goals, the TA provider must first help establish a comprehensive process control program and then provide ongoing assistance in evaluating the data that is generated in order to enable the operations staff to make appropriate process adjustments. This paper addresses 4 case studies of ENR facilities that have participated in the MCET TA program for anywhere from 1.5 to 2.5 years. Each of the 4 facilities utilizes a different process configuration and includes a 5-stage Bardenpho, a 4-stage Bardenpho, a Biolac Wave-Ox, and an SBR. Although the processes are varied, they all had to meet the same ENR requirements. In proceeding with the TA projects, a number of issues had to be addressed that in many cases were unique to that particular process. It was a learning experience for both the O&M staff and the TA provider in dealing with the variety of issues associated with each project in order to achieve the goal of consistent performance. We will discuss specific lessons learned for each project and then summarize the lessons common to all 4 projects with emphasis on those issues that had the most significant impact on achieving the program goals.

8/30/2018, Room 202, 2:00:00 PM to 2:30:00 PM,
Presenter: Joel Caudill, WSSC, Joel.Caudill@WSSCWater.com
Title: Maryland's new Water Quality Trading Regulations – A Utility's Perspective.
Abstract: In December 2018 Maryland Department of the Environment issued the final draft regulations for Maryland's new water quality trading program. The stated purpose of the regulations is to establish trading between source sectors (agriculture, wastewater, storm water, and on-site sewage disposal) to improve water quality in the Chesapeake Bay and in other local waters. Water Quality (Nutrient and sediments) trading has the potential to create opportunity for credit generators whose treatment performance exceeds their obligations under their permit and credit purchasers who are in need of credits to meet their permit due to time and cost constraints. The final public comment period for the proposed regulations closed on January 8, 2018 and it is anticipated that the final regulations will be published within the next several weeks. This presentation will summarize the regulation from a wastewater utility perspective and will provide observations and insights on this regulation and on a closely related MDE initiative, the Clean Water Commerce Act.

8/30/2018, Room 202, 2:30:00 PM to 3:00:00 PM,
Presenter: Kevin Selock, WSSC - Piscataway WWTP, kevin.selock@wsscwater.com
Title: Utilities of the Future - Evaluating & Improving Energy Use at WSSC's Water Resource Recovery Facilities
Abstract: The water industry "Utilities of the Future" have undertaken a N-E-W paradigm shift (Nutrients, Energy, and Water) and are moving towards "Resource Recovery". WSSC upper management asked "Where are we at, and where should we be heading?" An evaluation was undertaken which looked at all 3 areas – and this is a summary of the energy evaluation. The energy evaluation began with constructing Excel energy models for each of the major WWRFs; the models focused on each piece of process equipment and motor sizes, and then using the process control system trends, accurate estimates of run hours were used to estimate the resulting monthly energy usages. The estimated energy usages were compared to actual power bills, and there was a high degree of correlation with the summer time bills (which focused on process loads and didn't include seasonal heating demands). The resulting models identified how much energy is used at each stage of treatment (ie. pumping, preliminary treatment, secondary treatment, advanced treatment, as well as the solids handling trains) and the kWh/million gallons treated. The cumulative energy use in kWh/mg was then benchmarked against WERF's Utilities of the Future estimates to determine how WSSC compared to typical energy intensities at other facilities, as well as future best practice estimates. While conducting the energy evaluations, a number of immediate energy improvement opportunities were identified. These included shutting off equipment which might not be needed (such as utility water pumps or air stripping blowers), replacement of older energy inefficient equipment with newer more efficient models (such as mixers), optimizing energy use to meet actual demands (UV systems, blowers which were/are venting excess air, or possible rethinking of how we handle winter heating requirements). Examples of these opportunities will be summarized – because they're likely common at other utilities as well. With regards to "Utilities of the Future" and where WSSC should be heading, brief updates will be provided on the WSSC BioEnergy project and renewable energies (such as wind and solar). If sufficient time remains, we'll also try to describe some of the major challenges associated with hydro power and / or thermal recovery.

8/30/2018, Room 202, 3:00:00 PM to 3:30:00 PM,
Presenter: Kelvin George, GHD, Inc., kelvin.george@ghd.com
Title: Design and Construction Considerations of a Wastewater Treatment Plant Ocean Outfall
Abstract: As part of a consent order issued by the Delaware Department of Natural Resources and Environment Control (DNREC), the City of Rehoboth Beach is required to eliminate discharge of treated effluent from the Rehoboth Beach Wastewater Treatment Plant into the Lewes-Rehoboth Canal by June 1, 2018. Alternative methods of effluent disposal were evaluated and an Ocean Outfall was determined to be the preferred alternative. The design was completed in Spring 2017 and included a new effluent pumping station, 11,000 feet of 24-inch diameter force main running through the City and an ocean outfall pipe with diffuser assembly at the end. Construction began in Fall 2017 and is expected to be completed in Summer 2018. The presentation will cover the design and construction of the ocean outfall which consisted of 6,000 feet of 24-inch diameter high density polyethylene (HDPE) pipe with a diffuser assembly at the end. The outfall pipe was installed using a combination of horizontal directional drill (HDD) and open-cut marine trench. Approximately 3,800 feet of pipe was installed via HDD while approximately 2,200 feet of pipe was installed via open-cut marine trench excavation. Open-cut marine excavation was performed using a crane on a barge with a clamshell bucket. The 2,200 feet of HDPE pipe towed to the open trench and sunk with the use of concrete ballast collars into the trench. The 3,800 feet of HDPE pipe was towed and installed from the HDD exit point and pulled towards land. The HDPE pipe was fabricated in the Delaware Bay in two strings and towed to the outfall site using controlled submergence. A 130 foot diffuser assembly was installed at the end of the HDPE pipe and supported at the ocean floor by precast concrete grade beams under approximately 40 feet of water. The entire length of the trenched pipe and diffuser assembly was covered with backfill material and pre-cast concrete mattresses. The United States Army Corps of Engineers (USACE) DNREC permit for the project prohibits water work between March 1 and September 30, which means that all water work must be completed by February 28, 2018. This permit restriction induced limitations on an already tight project schedule. This is the largest capital project ever to be undertaken by the City of Rehoboth Beach and has garnered a lot of public attention due to the nature of the project.

8/30/2018, Room 202, 4:00:00 PM to 4:30:00 PM,
Presenter: Kelly Duffy, RK&K, kduffy@rkk.com
Title: New Greensboro Regional Wastewater System: Implementation and Start-up of New ENR 0.332 mgd WWTP, Conveyance and Collection System
Abstract: The Greensboro Regional Wastewater System is a newly constructed regional wastewater solution to serve two small towns on the Eastern Shore of Maryland. The project serves the Towns of Greensboro and Goldsboro in Caroline County, MD and is owned and operated by Greensboro. A new Enhanced Nutrient Removal (ENR) wastewater treatment plant (WWTP) was constructed in Greensboro to replace a non-nutrient removal, aged facility located in the flood plain. The new WWTP also serves Goldsboro which was under Consent Order since the 1990s for failing septic systems. The towns are approximately five miles apart. The project was implemented under five construction contracts: 1) new WWTP, 2) new pumping station and force main from the former Greensboro WWTP to the new WWTP, 3) conveyance line from Goldsboro to Greensboro, 4) collection system within Goldsboro, and 5) grinder pump systems on private property within Goldsboro. Construction of Contract Nos. 1 through 4 is complete. Contract No. 5 is currently under construction and will be complete by end of 2018. The 0.332 mgd WWTP has been operational since November 2016 and utilizes grit removal, sequencing batch reactor (SBR) technology, upflow, continuous backwash denitrification filters, and UV disinfection. Alum, methanol, and sodium hypochlorite chemical storage and feed systems were provided. Low-cost reed bed technology is used for sludge dewatering. The SBR system utilizes jet mixing/aeration and was provided by Evoqua, who also provided the filtration system. The start-up of the WWTP required the bulk of the process acclimation during the winter months of 2016-2017. The low nitrate effluent limits required very efficient nitrification and denitrification. Due to the cold temperature during startup, it was very difficult to get the biomass to fully nitrify. Several remedies were tried over the long acclimation process, including the addition of specialty nitrifiers, adjusting the mechanical equipment operation, and adjusting the control scheme. After a long startup period, the plant was able to meet ENR limits of 3.0 mg/l total nitrogen. In January 2017, the average ammonia out of the SBR was 18.3 mg/l, with 0.9 mg/l nitrates. At that time, the average effluent out of the filter was 17.9 mg/l ammonia and 0.6 mg/l nitrates. For July through late 2017, the average discharge from the plant was below detection limits (< 0.1 mg/l) for ammonia, and 1.8 mg/l nitrates. Operational data, process adjustments, start-up issues and resulting impacts will be presented. A future expansion to serve three additional towns located to the north of Goldsboro is planned. The project provides a cost-effective solution for several small towns. The project is a result of a long-term planning and funding effort from federal, state and local funds. In October 2017, the Greensboro WWTP was recognized with a Water/Environment Award of Merit from Engineering News-Record (ENR) Mid-Atlantic. In addition to operational data, highlights of the planning, permitting, design, construction and start-up of this multi-year project will be presented. Non-technical aspects of funding and agreements made between the Towns and with three funding agencies (USDA, MDE, and CDBG) will also be presented.

8/30/2018, Room 202, 4:30:00 PM to 5:00:00 PM,
Presenter: Partha Tallapragada, Maryland Environmental Service, ptall@menv.com
Title: Rocky Gap Wastewater Treatment Facility Upgrade to Membrane Bioreactor (MBR) Doubling Capacity to ENR Compliane in the Same Footprint Design and Construction Challenges
Abstract: The Maryland Environmental Service (MES) operates and maintains the Rocky Gap waste water treatment facility located in Flintstone, Allegany County, Maryland. It is situated inside the picturesque Rocky Gap State Park managed by the Department of Natural Resources. The Rocky Gap Casino is now part of the Park. Consequently there is a need to increase plant capacity. The existing 80,000 gallons per day capacity treatment facility consists of two extended aeration trains with rectangular clarifiers. A 90,000 gallon equalization basin provides storage during peak flow and I/I conditions. The clarifier effluent is polished in mechanical sand filters. The effluent is then disinfected with UV prior to discharge. With a very tight footprint and no room for adding more tankage, MES after careful consideration, decided to modify the treatment process train by incorporating the Membrane Bio Reactor (MBR) technology to almost double the hydraulic capacity of the existing facility to 150,000 gpd and simultaneously achieve enhanced nutrient removal (ENR) discharge limits. The site is extremely tight and the challenge was to place the new 2-train, 4-stage MBR treatment process within the existing concrete tanks, while keeping the plant in operation. It was similar to changing a flat tire of a car that is travelling at 65 miles per hour! WATEK Engineering Corporation assisted MES in the pre selection of membranes and associated equipment and engineered the project design documents for MDE construction permit approval. Ovivo supplied the UF membranes along with the ancillary equipment and is responsible for equipment integration and performance warranties. The following Items will be included in the presentation: Reasons for selecting Membrane Bio Reactor, Ultra filtration versus Micro filtration debate, Changing Power to the entire plant from Single Phase to 480, 60 HZ, 3 Phase,Energy and chemical efficiency, VFDs, ORP based chemical feed controls and LED lighting, Converting the old sand filter building to Process Control, Lab and New Offices, Difficulty of Construction sequencing and limitations, Temporary Packaged MBR Plant, Fibers and Raw Wastewater Quality Issues, Grease abatement and concerns about impacts on the Membranes, Fine Screen System, UV Disinfection System, Control System, CIP system, Start-up and Commissioning, Performance Testing and 6 month of operational data, Lessons learned throughout the design and construction. The plant upgrade commenced in March 2017. All of the equipment is installed and the vendor is performing preliminary checks. The new permanent plant is enclosed in a fiber glass building. Plant seeding with good quality nitrified activated sludge is scheduled to begin towards the end of January 2018 and a 21 day performance test period will begin thereafter. MES will collect sampling data and incorporate the same when the final draft of this paper is prepared upon acceptance by Tricon.

8/30/2018, Room 202, 5:00:00 PM to 5:30:00 PM,

Presenter: Kevin Nash, RK&K, knash@rkk.com

Title: Enhanced Nutrient Removal Upgrade of the Winebrenner WWTP Using Ballasted Activated Sludge

Abstract: Washington County has several small-medium sized treatment facilities, which were to be upgraded to Enhanced Nutrient Removal (ENR) standards. A preliminary engineering report (PER) was prepared in 2008 for ENR upgrades of: Winebrenner WWTP, Conococheague WWTP, and Smithsburg WWTP. The estimated construction costs for upgrading these three plants was prohibitively expensive and so an emerging technology was evaluated for potential cost savings while achieving ENR reliably. In 2010, a full-scale, 10-month pilot test was performed at the Winebrenner WWTP using ballasted activated sludge in a four-stage Bardenpho configuration. The ballast system was provide as BioMag, currently marketed by Evoqua. The pilot was the first trial for the BioMag technology to demonstrate nutrient removal. The test was successful and the results were presented at TriCon in 2011. The County elected to implement BioMag at each of the three facilities slated for ENR upgrade. The Smithsburg WWTP has been operating BioMag successfully for several years allowing the plant to meet a year-round ammonia permit. The ENR upgrade for the Smithsburg WWTP is currently under design. The Conococheague WWTP ENR upgrade is currently under construction and should be complete by spring of 2018. At the Winebrenner WWTP, the use of BioMag allowed the existing clarifiers to be re-used and minimize the size of the new reactor which was critical given the space constraints on the site. A new four-stage Bardenpho reactor was constructed to replace the existing RBCs. The new reactor utilizes a hyperboloid mixing/aeration system that decouples the mixing and aeration, allowing for better dissolved oxygen control while maintaining mixing to keep the ballasted activated sludge in suspension. The anoxic zones are fed supplemental carbon to aid in dentrification and supplement influent loadings which are low due to the leaky collection system and STEP collection system contributors. The ENR system has been operational since June 2016 and is meeting the ENR limits reliably.

8/30/2018, Room 203, 8:30:00 AM to 9:00:00 AM,

Presenter: Mike Hess, Brown and Caldwell, MHess@brwncald.com

Title: Trunk Sewer Rehabilitation in Urban, High Security Areas – Washington DC

Abstract: This presentation will describe how the Project Design Engineers coordinated, managed, and evaluated trenchless sewer rehabilitation technologies to meet the requirements of a high security environment while limiting impacts to pedestrian and vehicular traffic along Pennsylvania Ave in Washington, DC. The Low Area Trunk Sewer, a 42-in brick and concrete pipe, was constructed over a hundred years ago to provide basement service to buildings located along Pennsylvania Avenue between the White House and the Capitol building. Many of these buildings currently house multiple federal agencies each with security restrictions in order to access the sewer. The pipe has experienced wall loss due to corrosion prompting DC Water to rehabilitate it to increase the reliability of service. Because of its proximity to high security areas and the high volume of pedestrian and vehicular traffic along Pennsylvania Avenue, DC Water engaged in an extensive outreach program to educate and involve key stakeholders. This process was critical in determining the work hours and work area restrictions. These restrictions, as well as the geometric limitations within the pipe, were used to evaluate each sewer segment to determine the most practical rehabilitation methods. Innovative solutions were developed for 20 foot deep laterals with limited access and constructability challenges. Along the Pennsylvania Ave corridor, there were 25 laterals and side sewers that were intensively evaluated in order to bypass flow without excavating access pits so as to limit the impacts on the surrounding area and to adhere to the stakeholder's requirements. The final design included the potential for four pipe rehabilitation methods: cured-in-place pipe, spiral wound pipe, sliplining, and geopolymer lining. Construction is scheduled to begin in summer of 2018.

8/30/2018, Room 203, 9:00:00 AM to 9:30:00 AM,

Presenter: Jim Shelton, Arcadis, james.Shelton@arcadis.com

Title: Little Cuyahoga Interceptor Slip Line Replacement

Abstract: The 87" and 75" diameter brick Little Cuyahoga Interceptor (LCI) was constructed in 1928 as the main combined interceptor for conveying sewage and stormwater from City of Akron along the Little Cuyahoga River. Planned tunnel construction adjacent to 2800 lf of the LCI was expected to impose loads and vibrations that might collapse the LCI. The City desired a solution that would prevent collapse, provide an additional 50 years of operating life, eliminated a near full pipe sage in one segment, maximize capacity of the LCI, and be constructed before initiation of tunnel construction. Geotechnical investigations, internal multi-sensor inspections (video, virtual mandrel measurements, pipe ovality, protraction measurements, and insitu slope measurement), site access evaluations along the Little Cuyahoga River and several tributary crossing, tributary sewer connection evaluations, included two river crossing tributary lines, bypass piping constraints, wetland permits, and dynamic hydraulic modeling were used to evaluate four replacement/lining approaches considered technically pragmatic: 1. Hard pipe sliplining 2. Cured in place pipe lining (CIPPL) 3. Same trench relay 4. Parallel trench relay Conceptual cost evaluations indicated a 20% range in costs between these alternatives. In the end, Akron selected hard pipe sliplining with an open cut replacement of the sagged segment. While the primary appeal was the ability to construct in the wet with limited bypass, in the end the contractor elected to install a significant bypass system. This presentation will focus on the construction phase of this $8M work. Status The construction was completed in 2016.

8/30/2018, Room 203, 9:30:00 AM to 10:00:00 AM,

Presenter: Haile Yerdaw, WSSC, haile.yerdaw@wsscwater.com

Title: Forensic Evaluation of a Failed 20-Inch CIP Force Main Located at WSSC Piscataway Waste Water Treatment Plant – Analysis and Lessons Learned

Abstract: A 20-inch pressurized sewer main ruptured on February 9, 2017 at the Washington Suburban Sanitary Commissions Piscataway wastewater treatment plant in Accokeek Maryland. The ruptured pipe is 52 years old and made of cast iron. The rupture resulted in spilling of an estimated 3.35 million gallons (MG) of untreated waste water into the Piscataway creek and an additional 1.5 MG is estimated to have infiltrated into the ground. A forensic investigation was conducted to determine the cause and mode of failure of the force main. A fracture, material, geotechnical, and corrosion analysis was performed as part of the forensic investigation and was conducted over a period of seven months. The investigation also included destructive testing, which provided further insight on the mechanical properties of the cast iron pipe material. WSSC engineers reviewed the as-built plans from the original construction of the failed force main, recent construction projects in the vicinity of the main and photographs of the bedding conditions taken prior to the main being exhumed in support of the investigation. The failed pipe experienced an approximately 14 ft. long longitudinal crack at the 6 o'clock position. The results of the investigation indicated that the failure was due to an initial crack that propagated and grew along the invert of the main over a period of time. Preliminarily, WSSC consultants determined that the crack initiation was likely due to a single low frequency loading event (e.g., heavy equipment movement in proximity to main, 2011 earthquake event). However, WSSC engineers reviewed this determination, along with others possible causes, and concluded that the most likely cause of the crack initiation and therefore failure, is due to improper type and construction of bedding underneath the main. Additional contributing factors to the failure include dewatering construction activities in the vicinity of the main that may have increased the load above the pipe. Insufficient bedding support and sustained loading on the main over a relatively extended period of time was determined to have caused the crack to initiate, propagate and subsequently cause the main to fail.

8/30/2018, Room 203, 11:00:00 AM to 11:30:00 AM,

Presenter: Anna Neugebauer, CDM Smith, neugebauera@cdmsmith.com

Title: Why an All Pipe Dynamic Sewer System Model? WSSC's Story of Increasing Accuracy of the Dynamic Sewer System Model

Abstract: The Washington Suburban Sanitary Commission (WSSC) provides water and wastewater services to 1.8 million residents in Prince George's and Montgomery counties in Maryland. WSSC maintains dynamic sanitary sewer system models of its wastewater collection system that were developed 2005 through 2008. The current models focus on sewers 15 inches and larger, and were calibrated to flow data from 2003-2005. WSSC and CDM Smith are working together to update and expand these models to all-pipe models and recalibrate them using recent flow monitoring data. Development of all-pipe models presents a series of challenges, such as having accurate data for all sewers, maximizing the use of existing flow meter data, and distributing base sanitary, groundwater infiltration, and wet weather flows within the collection system. This paper will present innovative solutions implemented by WSSC to address these challenges. This paper will also discuss key benefits of having all-pipe models of all WSSC-maintained sanitary sewers, including: 1) Faster response for evaluation of capacity needs for new development as having a model with all sanitary sewers loaded with existing dry and wet weather flows eliminates the need to develop separate models for every capacity request. 2) Tools for evaluating basement back-ups and rare sewer system overflows to determine if they are capacity related or result from operation and maintenance concerns.3) Opportunity for a full review and update of WSSC sanitary sewer system GIS data. 4) Account for impact of storage and routing in upstream systems on peak flow rates. Inclusion low-pressure grinder pump conveyance systems provides tools for evaluating and optimizing their operation and maintenance.

8/30/2018, Room 203, 11:30:00 AM to 12:00:00 PM,

Presenter: Will Hinz, Whitman, Requardt & Associates, LLP, whinz@wrallp.com

Title: Why Can't I Get Service Too? Providing Sewer Service in Fallston with Limited Capacity

Abstract: Harford County is challenged with providing sewer service to the Fallston Sanitary Sub-district (FSSD) and the surrounding designated growth areas by maximizing the potential of the existing limited infrastructure. The FSSD was legislatively created in 1992 by a petition to serve a limited area of approximately 292 specific parcels within the Fallston Commercial Corridor. Harford County Department of Public Works (HCDPW) completed construction of the sewer infrastructure in 1997. Limited additional annexations into the Sub-district has occurred as well as continued development/redevelopment within the FSSD. The existing system consists of approximately 28,000 linear feet of gravity sewer and three pump stations with associated force mains. In 2015, the County received petitions for additional annexations by both potential business areas, as well as homeowners from existing developments adjacent to the FSSD with failing septic systems. In 2017, the County was going through its Comprehensive Zoning Review Process, which occurs every 8 years. The HCDPW determined that a comprehensive engineering study of the FSSD was required based upon current laws, codes, rules and regulations including the County Adequate Public Facilities Ordinance, County design standards, MDE and EPA Guidelines and planning documents. The overall goal of the study was to review the available limited capacity in the existing system as required to support the growth being identified within the petition areas and the Development Envelope. The specific objectives of the study included: (1.)Determining existing and future wastewater flows generated within the existing FSSD; (2.)Evaluating the existing sewer system capacity to convey the wastewater flows;(3.)Determining future additional wastewater flows to be generated within the addition areas within Development Envelope and outside the existing FSSD; (4.)Evaluating the sewer system capacity to convey the additional flows; (5.) Identifying the improvements needed with associated capital costs within the existing Fallston system for the identified potential annexation areas. To perform the analysis for the above objectives, Harford County provided WRA seven years of both metered water use and pump station SCADA flow data for the FSSD. With this data, WRA estimated existing dry weather, base infiltration and rainfall derived infiltration/inflow (RDII) within the existing system. Future additional flows were estimated based on County design standards. A steady state hydraulic model was developed using SewerCAD to both identify any potential deficiencies in the existing system as well as to estimate additional upgrades required to service the addition areas. Upon completion of the study, a public meeting was held with residents from both within the FSSD and the addition areas. The public meeting presented the project scope, findings and cost of improvements. Subsequent to the public meeting, the County is requesting funds to complete the necessary capital improvements as part of its capital improvement program, reviewing grant, loan and developer contribution options and is continuing the petition process to incorporate the petition areas. A policy is required to identify how the improvements will be implemented and funded with the overall objective of maximizing the existing facilities to provide sewer service within the FSSD and designated growth areas.

8/30/2018, Room 203, 12:00:00 PM to 12:30:00 PM,

Presenter: Bryan Bokey, Baltimore County, DPW, bbokey@baltimorecountymd.gov

Title: Upkeep of Sanitary Sewer Models

Abstract: Sanitary sewer models should be a living, breathing representation of the system and should not be sitting stagnant until they are needed. Now that the EPA has approved all of Baltimore County's Sewershed Repair, Replacement and Rehabilitation Plans, it is up to the Department of Public Works to manage, maintain and run these models. But keeping them up-to-date is not an easy task and often requires a team of engineers to review, manage, maintain, recalibrate and run them. Since entering a Consent Decree with the EPA in 2005, Baltimore County invested significant resources to build, calibrate and verify models for all 23 sewersheds. Starting with an inflow and infiltration study all the way through calibration and verification, these models, in many cases, took two years to complete. And once built, managing models consisting of 2.7 million LF of sewers pipes, over 100 pump stations and their associated force mains, and current flow monitoring data, is quite a big endeavor. One way these models are maintained is by having real-time access to flow and rainfall data. This allows the County to respond rapidly to requests from homeowners, developers, other government agencies and administrators. In addition to these requests, the model is used to spot-check existing model networks, study inflow and infiltration, analyze wet-weather events, expand pockets of previously non-modeled areas, review alternatives for capacity improvement projects, and evaluate requests for new development. Looking ahead, Baltimore County plans to continue integrating the models in new and innovative ways. Some areas into which the County hopes to incorporate these models include: asset management - using pipe capacity for different design storms as a likelihood of failure attribute, operation & maintenance - debris, blockages and encrustation could be entered into the model to analyze network effects and pump station operations, effectiveness of work - pre and post-flow monitoring data is inputted into the model to determine the effectiveness of inflow and infiltration removal projects, work order management - incorporate utility maintenance tasks, hydraulic modeling, GIS and field inspection into one platform. Despite all of the benefits, there are limitations that need to be understood. One is the absence of 8-inch collector pipes in the model network, which makes up about 75% of our system. A pilot program was started to incorporate 8-inch sewer pipes into one model. The challenge here was estimating flow in these pipes—in most cases, the closest meter was thousands of feet downstream. As a solution, population data and water use records were used to estimate the flow in these areas. The County's ability to keep sanitary sewer models up-to-date has been extremely helpful in identifying deficiencies and predicting issues before they arise. By understanding all of the benefits and limitations, the County has incorporated model results into its decision-making processes and plans to continue finding innovative ways to use the model network.

8/30/2018, Room 203, 2:00:00 PM to 2:30:00 PM,
Presenter: Chris Wilson, Brown and Caldwell, cwilson@brwncald.com
Title: Lessons Learned from HRSD's Condition Assessment Program
Abstract: HRSD owns and operates approximately 500 miles of wastewater gravity and force main pipelines and more than 80 pump stations in the Tidewater area of Virginia. Beginning in 2005, the USEPA and Virginia DEQ initiated enforcement actions against HRSD to reduce sewer overflows (SSOs). A Consent Decree was negotiated to accomplish this through development and implementation of a Regional Wet Weather Management Plan (RWWMP) and a Condition Assessment Program (CAP). Although much attention was focused on the RWWMP, the CAP has been an integral piece in HRSD's work to reduce SSOs in the region. The program included many steps from initial development of a program approach, desktop screening, implementation of several inspection contracts, examination of the collected data, and then preparation of a Rehabilitation Action Plan. HRSD has been on the forefront of pilot testing new technologies for force main inspection, with many bumps along the road, and has refined its program through ongoing updates since 2009. The program has also included pump station inspections, complete NASSCO PACP inspection of all gravity mains, as well as siphons, force main appurtenances, and aerial crossings. The Consent Decree required Condition Assessment Program was completed in 2013 and HRSD has continued with its program referred to as CAP 2.0. Through 2018, the program is being adjusted again for CAP 3.0 based on the many experiences, issues, and achievements made through CAP 2.0. This presentation will describe the lessons learned in implementing a comprehensive condition assessment program which can be applied to utilities of all sizes.

8/30/2018, Room 203, 2:30:00 PM to 3:00:00 PM,
Presenter: Pierre Cayatte, Arlington County, pcayatte@arlingtonva.us
Title: "A River Runs Through It" : Sanitary Sewer Stream Crossing Inspections in Arlington County
Abstract: Arlington County is located in Northern Virginia on the southwestern bank of the Potomac River directly across Washington D.C. With a land area of 26 square miles and a population of approximately 230,000 people, it is the geographically smallest self-governing county in the United States. Arlington's streams are an important natural and recreational resource with nearly 33 miles of perennial streams in the County. Significant stream bank erosion can expose utilities that become prone to breaking. Each year, Arlington County performs closed-circuit television (CCTV) inspection of approximately 20 miles of sanitary sewer. Sanitary sewer stream crossings are often hard to access due to vegetation, ponds, fences, or private property. As a result, most of them have not been inspected on a regular basis. As part of its comprehensive asset management program, Arlington County initiated sanitary sewer stream crossing inspections in early 2017. Arlington County Water, Sewer and Streets Bureau uses the Cartegraph asset management software whose mission is to help the County manage assets effectively, deploy resources efficiently and become more productive for their citizens. This sanitary sewer stream crossing inspection campaign was developed and implemented using Cartegraph to identify potential I&I sources, protect existing utilities, and prevent potential pollution of local streams. This presentation will focus on the inspection campaign methodology, management, and results. It will also provide examples of sanitary sewer stream crossing rehabilitation projects resulting from the inspections.

8/30/2018, Room 203, 3:00:00 PM to 3:30:00 PM,
Presenter: Prabhu Chandrasekeran, Greeley and Hansen LLC, cprabhushankar@gmail.com
Title: Caring for Orphan Assets!
Abstract: Over the last few decades, Water Industry have been relentlessly addressing the needs of aging buried infrastructure. Numerous utilities around this region and the nation have been performing SSES and condition assessment activities to determine the needs and deficiencies of collection systems. Gravity systems received the most attention and care. Utilities have been responding to SSO and CSO consent decrees, again, by focusing predominantly on the gravity systems, perhaps due to the simplistic nature of gravity systems, and the research and evolution of technologies addressing the inspection and rehabilitation of gravity sewer systems. While many utilities have become proficient in managing gravity systems, pressure systems have been forgotten and ignored as orphan assets. As many utilities have started to face the challenges of force main failures and subsequent public nuisance and expensive emergency repairs, there has been an uptick on the need for force main conditions assessments. Unlike gravity systems, physical inspection of force mains to assess the structural condition is limited primarily due to access limitations and cost-prohibitive bypass options. While utilities have started to develop asset management programs to systematically manage condition assessment projects and subsequent rehabilitation of force mains, it is imperative to understand the benefits and limitations of various inspection technologies to aid the effective planning of condition assessment using appropriate technologies. Force main failures are caused by: internal/external corrosion, cyclic loadings, hydraulic transients, and improper construction and third party failures. This paper will discuss phased approach in performing force main condition assessment activities, comparison of various inspection technologies, and selection of suitable technologies. Inspection technologies vary based on the location of inspection (internal/external), service interruptions, cleaning needs and access requirements. This paper will provide case studies of force main inspections using different technologies and lessons learned from the case studies involving inspection of various pipe materials including but not limited to PCCP, CI and DI pipes. Cost effective inspection technology alternatives to gas/leak detection technologies will also be discussed.

8/30/2018, Room 203, 4:00:00 PM to 4:30:00 PM,
Presenter: Robert Bell Jr., OBG, Robert.Bell@obg.com
Title: Avoiding Tunnel Vision in Large Diameter Infrastructure Rehabilitation
Abstract: The Virginia Tunnel is a 5,400 feet sewer that is 78-inches in diameter and 80-100 feet in depth. Constructed in 1963, this asset is part of the Potomac Interceptor and conveys flow from the Dulles Airport and portions of Loundon and Fairfax Counties to the DC Water Blue Plains Wastewater Plant. Based on CCTV and sonar inspection data, the tunnel has exhibited corrosion and deterioration. An initial assessment of this inspection data identified the pipeline as a high priority for rehabilitation. Rehabilitation design was initiated, but due to numerous challenges including site access, maintenance of flow, capacity requirements, and depths the project was never constructed. A fresh review of the project identified that the perceived risk of failure may have been overestimated. The project team utilized innovative inspection techniques including CCTV/Sonar/Laser/3D Lidar and Pipe Penetrating Radar to re-evaluate the structural integrity of the sewer in tandem with a geotechnical assessment. This evaluation allowed the team to properly assess the tunnel condition and associated risk. This presentation will present the project background and the pitfalls of standardized defect coding that contributed to the tunnel vision in the identification of rehabilitation alternatives. The presentation will provide a case study in how inspection strategies, when properly applied and evaluated result in higher resolution data from which to effectively assess risk and identify appropriate solutions that may result in significant cost and schedule savings.

8/30/2018, Room 203, 4:30:00 PM to 5:00:00 PM,
Presenter: John Moore PE, RK&K, jmoore@rkk.com
Title: Making it Right: New Sewers for the Historic Savage Community
Abstract: Savage is a historic community in Howard County that began over a century ago to support worker housing for the nearby Savage Mill. Today, Savage is a very economically and socially diverse residential community. The sewerage system that serves the Savage community evolved over many years and the sewers were constructed without County utility easements or really much thought where they discharged. Prior to the completion of this project, many sewers were located in backyards and paper streets making them inaccessible for maintenance by the County. There were many instances were sewage from one house passed through a neighbor's basement or yard or where structures were constructed up to or on top of the sewers. Plus, it was not always clear who was responsible for maintaining these "shared sewers". Poor mapping and the lack of as-built records further complicated the County's ability to maintain this system. To remedy the problem, Howard County completed a project in the Spring 2018 to reconstruct a new sewer system for the community that was accessible and met current County design standards. For this project, Howard County, the design engineer, the construction contractor and the Savage community all worked closely to construct the new sewerage system within existing roadways and to County design standards. This presentation will discuss the special coordination, design and construction challenges of rebuilding the sewerage system for the historic Savage community. The objective of this project was to separate all shared sewers, relocate the sewer mains into the County right-of-way, and get all 60 home owners to agree to the improvements and allow construction access to their property while maintaining minimum disturbance to an old community next to the historic County landmark of Savage Mill.

8/30/2018, Room 203, 5:00:00 PM to 5:30:00 PM,
Presenter: Mark Cusac, CDM Smith, cusacmi@cdmsmith.com
Title: DC Water's SCADA Infrastructure Standardization Program – Paving the Way into the Future
Abstract: In an ideal world, a Supervisory Control and Data Acquisition (SCADA) system consists of a single hardware and software platform, is programmed by one team, and functions in a consistent manner. In reality, these systems are often designed and implemented by numerous parties with their own preferences and standards. This situation leads to different hardware and software platforms and inconsistent programming methodologies that increase the burden on SCADA operations and support staff. DC Water distributes drinking water and collects and treats wastewater for more than 672,000 residents and 17.8 million annual visitors in the District of Columbia and provides wholesale wastewater treatment services for 1.6 million people in Maryland and Virginia. The size and complexity of the distribution and collection systems require a sophisticated SCADA system to control and monitor over 60 remote water and wastewater facilities. DC Water's SCADA system is a critical tool for providing system-wide monitoring and control for operations and to support better decision making. Various integrators have worked on DC Water's system over the years, which has led to inconsistencies in system operation, data presentation, alarming, and graphics; all which impact operations and maintenance staff. This has led DC Water to embark on a multi-year program to standardize their entire SCADA system. Tools have been developed to provide standardization of PLC programming and graphics development. These tools are being used to reprogram the system and implement new High-Performance Graphics to improve operator productivity and enhance situational awareness. This presentation will present how DC Water is completing their SCADA system standardization program. It will highlight standards development, implementation of standard programming blocks, and field verification efforts. The presentation will outline the next steps and offer recommendations and advice on how to develop and implement a SCADA standardization program.

8/30/2018, Room 204, 8:30:00 AM to 9:00:00 AM,

Presenter: Deidre Saunders, DC Water, Deidre.Saunders@dcwater.com

Title: St. Elizabeth's Water Tank Project

Abstract: Introduction/Background Areas east of the Anacostia River in Washington, DC have historically experienced low water pressure through the system. It had been more than 71 years since the last elevated storage tower was built in the District of Columbia. DC Water's St. Elizabeth's new 170-foot-high water storage tower construction began April 21, 2016 at a cost of about $14 million, and is scheduled to be placed into service spring of 2018. The project area is located near the Saint Elizabeth's Hospital National Historic Landmark (NHL) in the southeast section of DC. The proposed site for the new tank was sited adjacent to the newly constructed mutli-use complex. The new tower permits demolition of the existing tower, originally built in the 1930s which today is semi-operational, unable to provide adequate water pressure to the hospital facility. Upon completion of the St Elizabeth's project, DC Water will enhance the water system of the proposed Anacostia 2nd high service area, improving water quality, system reliability and water pressure, ensuring adequate flows throughout the system. Project Specifics As could be expected in any city center, there were significant challenges that required resolution prior to siting, design, and construction of the tower. Permitting, soils, historical, existing infrastructure and public relations were some of the most difficult challenges presented. Due to the project's overall sensitivity, the St. Elizabeth's WT required extensive coordination with several agencies for approvals and permits for the tower, the planning/approval process taking some 10 years. Some of the major coordination occurred with the Federal Aviation Administration, District Department of Transportation, Historic Preservation Board, DC Mayor's Office, and Washington Metropolitan Area Transit Authority. Soils issues necessitated additional attention and exploration to ensure the tower and environment wouldn't be compromised, both during the project and once online. Soils were explored prior to design, however, additional issues were discovered as more comprehensive site work was being performed. The issues were analyzed and resolved, allowing the contractor to continue work on certain features of work at the project site. Adjacent infrastructure is integral, especially with new water tower, as the pressure can be elevated potentially jeopardizing the integrity of the pipe network. After performing a hydraulic analysis, it was determined that approximately 4,000 feet of water main would needed to connect water tank into the water distribution system, which was included in the scope of the project. Public Relations for most sites, and a strong public relations campaign was conducted in the surrounding neighborhoods, as well as considering the nature of our nation's capital and its historical aspects. Summation The St. Elizabeth's Water Tower project was both rewarding and challenging. Addressing the normal and site specific issues allowed this new service area to provide much-needed water pressure and will improve fire protection and water pressure in homes, schools and businesses.

8/30/2018, Room 204, 9:00:00 AM to 9:30:00 AM,

Presenter: Nicole Clarke, Tank Industry Consultants, Clarke@TankIndustry.com

Title: Water Storage Tank Inspection Standards and Guidelines

Abstract: Water storage tanks are crucial components of your drinking water and fire protection systems. They are also very costly to replace, so proper maintenance of these structures is vitally important, and an essential element of proper maintenance is inspection. But how do you know what a good water tank inspection should entail? This presentation will offer an overview of AWWA tank inspection standards and guidelines, and compare them to other industry recommendations such as those published by the National Fire Protection Association (NFPA). The up-coming AWWA D101 inspection standard, AWWA M42, and the Steel Tank handbook will be reviewed and compared to NFPA 25 and guidelines of state regulatory agencies.

8/30/2018, Room 204, 9:30:00 AM to 10:00:00 AM,

Presenter: Jack Schneider, Fisher Tank Company, jschneider@FisherTank.com

Title: How to Expand Water Storage Capacity without Changing the Footprint

Abstract: The City needed to replace a 5.5 million gallon welded steel storage tank originally built in the late 1940s/early 1950s. The tank was six feet below grade, with extensive underground piping in place. The challenge was to build a new tank within the existing ring wall and provide for the restoration of the integrity and functionality of the original piping connections. The tank contractor designed and executed modification to the existing foundation to support the new load and the new tank was constructed within the original ring wall. The new welded steel tank was erected within the very limited interstitial space. When the new tank was complete, the original piping was reconnected, the interior baffles were reinstalled, and the new tank was successfully put into service. The tank work was performed per API 653 and API 650 standards. The presentation will include photos of the job underway, completed project photos, drawings, and details about the engineering, fabrication and construction processes, and the solutions employed.

8/30/2018, Room 204, 11:00:00 AM to 11:30:00 AM,
Presenter: Anna Pridmore, Structural Technologies, LLC, apridmore@structuraltec.com
Title: Tucson Water: Not Failing on My Watch
Abstract: The City of Tucson Water Department supplies and distributes water, and collects and treats wastewater for the city's over 500,000 residents. As part of its pipeline inventory Tucson Water has a 21 mile system of pre-stressed concrete cylinder pipe (PCCP) ranging from 48 to 96 inches. In 1999, Tucson experienced its first catastrophic failure on a 96-inch diameter PCCP, costing Tucson Water five million dollars due to property damage. Following this event a comprehensive asset management program was put into place for inspection and targeted replacement or rehabilitation of distressed segments of PCCP. Depending on the exact pipe location and other factors, numerous methods of rehabilitation are utilized including internal application of carbon fiber-reinforced polymer (CFRP) and external post-tensioning. The asset management program includes on-going acoustic monitoring (AFO) of the PCCP lines. This technology breakthrough, having the ability to hear real-time wire breaks and put into place contingency plans, allowed the City of avert another major line break in a 96-inch pipeline in 2012. The AFO system alerted Tucson of multiple wire breaks occurring, indicating catastrophic failure was imminent. The contingency plan was implemented and a carbon fiber-reinforced polymer (CFRP) lining was installed at the distressed segments. Currently the 54-inch line is being closely monitored and during 2016, 26 segments of the 54-inch line across 4.25 miles of pipe were structurally upgraded using CFRP. More recently a single segment of high demand line was structurally upgraded using external post-tensioning, an option available for lines which cannot be taken out of service. Prior to installation of the external post-tensioning repairs, the mortar coating and prestressing wire were stripped from the pipe to identify the number and location of wire breaks and to validate the AFO results. This external inspection identified scattered brittle wire breaks. Presence of the brittle wire breaks raised questions regarding the potential contribution of the cathodic protection system impressed current to embrittlement of the prestressing wires in certain parts of the pipeline, and the mode of wire failure that should be considered for failure risk analysis of other pipes in the line. This presentation will provide valuable information regarding maximizing the effectiveness of an asset management program which includes a proactive approach to monitoring and implementing immediate replacement or repairs. Tucson Water's perspective on rehabilitation methods utilized will be presented along with detailed information on the most recent repair projects including planning, design and construction implementation.

8/30/2018, Room 204, 11:30:00 AM to 12:00:00 PM,
Presenter: Jordan Carrier, Garney Companies, Inc., jcarrier@garney.com
Title: Eastern Parkway Water Transmission Main Rehabilitation – Sliplining with Steel Pipe Renews Critical 48-Inch Cast Iron Main Along Historic Olmstead Parkway
Abstract: This project extends the life of one of Louisville Water Company's oldest water mains by sliplining 42-inch steel pipe inside of the existing 48-inch cast iron pipe. Installed between 1923 and 1930, this 48-inch cast iron transmission main carries water from the Crescent Hill Treatment Plant on Frankfort Avenue to downtown and the Cardinal Hill Reservoir. It transports 15 to 20 million gallons of drinking water daily to Crescent Hill, the Highlands, downtown, Old Louisville and South Louisville. The pipe runs along historic Olmstead Parkway, a major east/west arterial with an average traffic volume of 20,000 vehicles per day, bordered by established neighborhoods, businesses and popular recreation areas. Being the largest water main repair project in Louisville Water's 156-year history along a heavily traveled historic parkway, the project presented many challenges. A partnership by the owner, consultant, stakeholders, contractor and pipe manufacturer set the foundation for successful design and construction for Phase I, renewal of more than 11,000 feet of pipe during a restricted off-peak winter demand period, while continuing service to all existing customers. This presentation will include aspects of the preliminary engineering evaluation, stakeholder involvement and communications, final design solutions and effective construction modifications that resulted in a successful project that exceeded expectations.

8/30/2018, Room 204, 12:00:00 PM to 12:30:00 PM,
Presenter: Allen Cox, Ductile Iron Pipe Research Association, acox@dipra.org
Title: Polyethylene Encasement for External Corrosion Control for Iron Pipelines – A Sixty Year History
Abstract: This talk presents the results of case histories of some of the oldest installations where gray cast and/or ductile iron pipelines were installed using polyethylene encasement as a means of corrosion control and how this method of protection was researched and developed. Investigative procedures included soil testing, excavation and physical inspection of exposed pipe sections, and laboratory testing of the polyethylene material. Included are testing results and the location sites of each investigation. The investigations demonstrate the effectiveness of polyethylene encasement as an external corrosion protection method for gray cast and/or ductile iron pipe and how this will allow a pipeline designer to implement a safe and sustainable design.

8/30/2018, Room 204, 2:00:00 PM to 2:30:00 PM,

Presenter: Brian Walker, PC Construction, bwalker@pcconstruction.com

Title: The City of Atlanta Water Supply Program: CMAR Done Right

Abstract: The presenters will discuss the City of Atlanta Water Supply Project, the Construction Management at-Risk (CMAR) method used to procure the project, and the features and benefits resulting in successful collaborative delivery for all parties involved. In May 2014, the City of Atlanta began an ambitious capital improvement project to update the City's water supply. The $300 million expansion of the City's raw water storage capacity will provide Atlanta with a reliable drinking water supply for the next 100 years and increase the emergency raw water reserve from three days to more than 30 days. The project includes the conversion of a 400-foot-deep rock quarry to a 2.4-billion-gallon facility; blasting of two circular 20- and 35-foot diameter, 200- and 300-foot-deep tunnel shafts near the quarry; five eight-foot diameter tunnel shafts; new power substation; a 180-mgd Hemphill Pump Station with four vertical turbine pumps; a 253-mgd Quarry Pump Station with four vertical turbine pumps and three submersible turbine pumps; and mechanical, electrical and SCADA associated with the pump stations. Work involves digging, boring and installing a five-mile, 10-foot-diameter tunnel from the quarry connecting to the Hemphill and Chattahoochee Water Treatment Plants. One of the keys to the success of this project would be the City's decision to use the CMAR delivery method. Through a qualifications-based procurement process, the City selected PC Construction as their CMAR. PC was selected early in the design process to take full advantage of a comprehensive preconstruction effort, ultimately allowing the City to achieve a project that meets their long-term goals and achieve best-value. In the traditional delivery method, the City would risk making procurement decisions based on the singular interpretation of the design engineer, which is further interpreted by contractors, subcontractors and vendors. However, with the CMAR delivery that risk is mitigated. The City contracted with the design firm and PC independently, creating an integrated project team, which provided checks and balances between design, construction, operating and life-cycle costs. On any major infrastructure project, the greatest percentage of project costs is allocated to construction. It was in the City's best interest to have detailed knowledge of costs (open-book), cost control (decision-making) and a teammate (relationship) for construction. As the CMAR, PC has been a consultant, advocate and agent for the owner and has provided comments and pricing on the design and offers alternatives based on cost, constructability, risk or schedule for consideration. This preconstruction effort during the design phase was critical to project success. Through this effort, the team reduced design, budget and schedule risks while meeting design and program needs. We optimized solutions between program, design and cost and leverages technology and process. Preconstruction effort provided information enabling informed decisions leading to best value. CMAR benefits for the City of Atlanta include control, cost certainty and schedule certainty. Control: Team selection (designer, contractor, subcontractors, vendors), collaborative decision making, maximize scope, effective QA/QC. Cost certainty: open-book, constructability and value engineering, life-cycle and energy costs. Schedule certainty: planning & construction overlap, minimize clashes, shorter project duration.

8/30/2018, Room 204, 2:30:00 PM to 3:00:00 PM,

Presenter: Pat Burke, Ferguson, Pat.Burke@Ferguson.com

Title: Valve and Hydrants-"Some days you are the dog, some days you are the hydrant"

Abstract: As you drive around Maryland, Delaware, and D.C. you will notice that as you go to each different county that the hydrants are a different color; however, what you may not know is each county's hydrant has different threads, different nozzles, and lots of different combinations that make each hydrant unique. This includes a variety of different brands, makes, and models. As Utilities tackle challenges such as water security, utility maintenance, and system maintenance, hydrants and valves are often overlooked, but provide a critical piece of infrastructure. In this abstract we would plan to show the differences between a county's valve and hydrant specification and explain the history and background on how they got there. This can create issues for fire departments, water departments, and others. We will also show how some other utilities from around the country are using valves and hydrants and the reasons why. Municipalities have very different specifications when it comes to valves in the water system. Some counties use C509 valves other use C515, on large diameter valves municipalities use Double Disk Valves, Cone Valves, and many others. With so many different options, utilities should be discussing what works and what does not. We would like to discuss what municipalities use and when the advantages and disadvantages are each type of valve. Valves and hydrants are an important part of the water system and Fire protection. When a house is on fire and the fire department comes up to the hydrant they expect it to work. If it doesn't it could be a variety of issues- Fire hydrant not maintained, Valves are not properly opened, or they may just not have the training to properly work a fire hydrant in a different municipality. Some days you are the dog, some days you are the hydrant.

8/30/2018, Room 204, 3:00:00 PM to 3:30:00 PM,

Presenter: Steven Anderson, KCI Technologies, Inc., steven.anderson@kci.com

Title: Water Supply Power & Control Reliability Improvements, Elkridge Booster Pump Station, Howard County

Abstract: KCI was selected by Howard County Bureau of Utilities to investigate and recommend improvements for the Elkridge Booster Pumping Station (BPS) to increase water supply reliability in the Snowden River elevated water storage zone. The station was constructed in the 1960s and underwent major upgrades in the 1990s to modernize variable speed control and operations. Howard County receives its primary water supply from the City of Baltimore (COB) and a secondary supplemental source from WSSC. The Elkridge BPS lifts the COB 250 Zone to the County central 550 Zone. The station is dual-fed by a 5kV utility system which supports two (2) 2400V constant speed pumps and two (2) 480V variable speed pumps. KCI was asked to provide engineering services to upgrade and enhance variable speed pump controls, increase station power systems reliability, and ensure proper SCADA integration. In 2013 KCI provided investigations and design for new variable speed pump controls and standby power systems. The existing variable speed controls had failed and the dual-feed service wasn't always reliable. Recommendations also included SCADA, power distribution and ventilation system upgrades. The station 2400V gear includes a main-tie-main switching arrangement to manually dedicate utility feeders to station Pumps #1 & #2 services and Pumps #3 & #4 services. Based on the need for increased reliability, KCI proposed the addition of a 480V standby power generator to safeguard operations of variable speed Pumps #1 & #3. Due to the existing conditions, standby power was designed with dedicated ATS units and load bank connections for each pump. Due to ATS complexity, the station PLC system was modified to include generator power fail operations and exercise mode controls. The VFD upgrades included reduced voltage starters, motor monitors, and ventilation improvements. The drive systems also included dedicated active filters to neutralize harmonic distortion to protect and optimize the station's primary and standby power systems. The generator was modeled for both VFD and reduced voltage starter loads. A 1250kW generator was selected specifically for non-linear load / stepped operations with minimized voltage and frequency drop conditions. An exterior walk-in acoustical grade enclosure with sub-base fuel-oil storage was selected to minimize footprint and projected noise levels. Additional landscape screening was provided for aesthetic treatment. The Elkridge Station is a regional communications hub, the original design concept was to limit SCADA upgrades, but in an effort to increase regional communications reliability, it was agreed upon to upgrade and replace the aging control system with the new Siemens / Primex product line as required by County SCADA standards. Seasonal operational flexibility during 2016 facilitated power and control upgrades, but extensive staging of the SCADA system was required during construction to maintain communications. Replacement of the station RTU control system required vast coordination with the existing control systems to integrate the proposed VFD equipment. Due to station improvements over the years, as-built documents were not always accurate, complicating construction progress. An accurate account of the station controls and power systems have been provided to the County upon completion of this contract.

8/30/2018, Room 204, 4:00:00 PM to 4:30:00 PM,

Presenter: James Parkes, Schnabel Engineering, jparkes@schnabel-eng.com

Title: New Pipeline Installations – Which Trenchless Method is Best?

Abstract: Many new water system projects include pipelines that must be installed using trenchless means and methods. These facilities may include new raw water transmission mains, water distribution mains, sewers, or storm drains. Trenchless installations may be used to install the entire length of pipeline or for discrete segments of the pipeline, such as crossings under railroads, highways, or creeks or rivers. A variety of trenchless methods are available for such applications, but the capabilities of the various methods must be considered and the best suited methods selected for the proposed project conditions. Available trenchless methods include: auger bore with jacked casing, hand mining with jacked casing, hand mining with liner plate, microtunneling, pipe ramming, and horizontal directional drilling (HDD). The applicability of these methods depends on the size, type, and length of pipe to be installed, the geologic conditions of the installation, and the potential impacts to third parties or overlying infrastructure. Each of these methods will be described, as well as applicability to pipeline sizes and types, geology, and project conditions. Applicable diameters and lengths of pipelines will be discussed. Geologic considerations include the consistency of soil and sediments, potential presence of cobbles and boulders or other obstructions, the presence of rock, and groundwater conditions. The applicability of each method with regard to these geologic considerations will be discussed. Additional considerations such as potential for settlements, impacts to overlying or adjacent infrastructure, third party issues, and space requirements for pits will also be addressed.

8/30/2018, Room 204, 4:30:00 PM to 5:00:00 PM,

Presenter: Louis Ragozzino, OBG, louis.ragozzino@obg.com

Title: Tunneling under Howard County - Construction of Two 60-inch Casings for the Installation of a 36-inch Water Transmission Main in Howard County, Maryland

Abstract: As one of Maryland's fastest-growing regions, Howard County has seen a 34 percent increase in population over the past decade. Projected growth will continue to 327,635 by 2035.As a result and as a means of improving reliability, the Howard County Department of Public Works installed approximately 16,400 lf (3.1 miles) of 36" Diameter Water Transmission Main using a combination of bar wrapped concrete cylinder pipe and Prestressed Concrete Cylinder Pipe (PCCP), in the Columbia area. Water to this region is provided via a single 30" PCCP water main which has experience breaks and age related problems. The County decided that they would like to provide a redundant water main such that they could rehabilitate and possibly protect the existing PCCP main after the new main was in place. This project provides a redundant water supply to serve the Columbia area and critical facilities located in the area including but not limited to, The Mall in Columbia, Howard County General Hospital, Howard Community College and other various commercial and residential institutions. The project required the construction of two 60-inch diameter steel casings using micro-tunnel techniques and tunnel boring machines. One tunnel is 470 feet and the other 750 feet and both were constructed in a mixed face of soil and rock. The 32-foot diameter circular tunnel launching shaft was located adjacent to the Little Patuxent River, under which the 470-foot tunnel was installed, and which also had experienced record flooding the previous spring. Construction measures had to be implemented to provide dewatering of the shaft as well as to prevent the flooding of the shaft in the event of a large storm event. Each tunnel crosses under U.S. Route 29, an active state highway, which required the installation and monitoring of settlement and inclination monitors during the tunneling process. In addition, due to the depth of the tunnels, approximately 35 feet, the PCCP carrier pipe installed was manufactured with a 5-inch wall thickness to support the earth loads. This resulted in an unusually larger outside diameter of the 36-inch pipe, requiring transition pieces between the PCCP and bar wrapped pipe. In addition, a concrete saddle was provided at the location of the end of the 60-inch casing to support the carrier pipe. Another challenging portion of the project was the installation of 7,500 feet of water main in one of the busiest roads in the region, Little Patuxent Parkway, a three-lane ring road of The Columbia Mall, other significant commercial and residential properties, and a major arterial. Howard County chose a complete closer of the three-lane road to accommodate and expedite construction within a tight timeframe to limit impacts on local businesses.

8/30/2018, Room 204, 5:00:00 PM to 5:30:00 PM,

Presenter: Paul Deardorff, JMT, pdeardorff@jmt.com

Title: Inspection of the 137-Year Old Montebello - Cromwell Tunnel with a Remote Operated Vehicle

Abstract: The City of Baltimore finished construction of the original Loch Raven Tunnel in 1880. The tunnel supplied water from the Gunpowder Falls to Lake Montebello. The tunnel is a rock tunnel that is 12 feet in diameter. At its deepest point, the tunnel is approximately 360 feet below grade. In the late 1930s, the new Gundpowder Falls – Montebello Tunnel was built to supply water to the Montebello Filtration Plant. In the 1950s, the City of Baltimore and Baltimore County proposed a plan to reverse flow in the Old Loch Raven Tunnel and construct the Cromwell Water Pumping Station at tunnel Shaft No. 2, which would be used as the suction point for vertical turbine pumps installed in the pumping station. The Old Loch Raven Tunnel was repurposed as the Montebello – Cromwell Tunnel to deliver water from the Montebello Filtration Plant to the Cromwell Water Pumping Station, which supplies filtered water to the Eastern Third Zone of the City's System. As part of an improvements contract at the Cromwell Water Pumping Station, the City intended to complete an inspection of the 137-year old Montebello – Cromwell Tunnel. The tunnel was last inspected in the 1980s by a group of inspectors who entered a dewatered tunnel and navigated the tunnel on foot and in small boats. The plan for the current inspection was similar, but the plan was terminated because of concerns with the structural integrity of the rock tunnel in a dewatered condition. The City evaluated options to inspect the tunnel without dewatering and decided to utilize a remotely operated vehicle (ROV) to inspect the 5.5-mile long Cromwell – Montebello Tunnel. The ROV is equipped with sonar, video and navigation systems connected by a tether to an at-grade control station that allows a detailed inspection of the tunnel without dewatering. The ROV dimensions are 12 ft long, 2 ft wide and 1.5 ft high, and the vehicle weighs approximately 1400 lbs. The ROV entered the Cromwell – Montebello Tunnel at the access shaft located in the filter washwater lake at the Montebello Filtration Plant. The irregularities of the access shaft and tunnel interface presented challenges for the inspection crew and required field modifications of the inspection set-up. Once the ROV was able to enter the Tunnel, the vehicle made an approximately 10-hour roundtrip to the Cromwell Water Pumping Station and back to the Montebello Filtration Plant for retrieval. The Cromwell – Montebello Tunnel inspection was completed in June 2017. This paper will discuss considerations associated with scope development with inspections contractors. Considerations for site access, inspection set-up, and tunnel inspection operations will be provided. Actions taken by the owner and inspections contractor to guard against, monitor and prepare to mitigate impacts to the potable water supply during the inspection will be discussed. A summary of the inspections report and findings will be provided. This presentation will be useful to utilities interested in evaluating technologies to inspect buried infrastructure while maintaining system operations and supply.

8/30/2018, Room 205, 8:30:00 AM to 9:00:00 AM,

Presenter: Karen Benson, WSP (formerly LBG, Inc.), kbenson@lbgnj.com

Title: Emerging Groundwater Supply Concerns

Abstract: This presentation will focus on discussing the more recently recognized potential impacts of climate change and land use on groundwater supplies. Areas of discussion will include brackish/saltwater migration into coastal and tidal rivers related to storm surges; drought impacts due to long-term climate variations on precipitation patterns; and land-use related “emerging contaminant” impacts on groundwater quality. The presentation will focus on sodium and chloride concentration increases over time; the more recent identification and sources of ubiquitous PFOS/PFAS and 1, 4 dioxane; and the need to re-assess screen and pump setting in wells due to these impacts. Possible options for groundwater supply purveyors to be more resilient and adjust to these changing conditions will also be discussed.

8/30/2018, Room 205, 9:00:00 AM to 9:30:00 AM,

Presenter: Gary Schaeffer, UGSI Solutions, Inc., gschaeffer@ugsicorp.com

Title: Active Control of THM Levels in Drinking Water Distribution Systems

Abstract: Elevated trihalomethane (THM) levels are the most common violations of the Stage 2 DBP Rule in the United States. Municipalities across the country have employed a variety of methods to reduce THM formation rates, often incurring costly and lengthy treatment plant upgrades, which often provide dismal reduction levels. Active tank mixing, in-tank aeration, and head-space ventilation systems are three tools that, used in thoughtful combination, can yield significant reductions in distribution system THM levels. These technologies make storage tanks a smart and active agent in the management and improvement of water quality instead of a passive vessel holding water of uncertain quality. In 2014, the San Jose Water Company installed a large-scale THM reduction system in a 12 MG reservoir. The combination of an energy-optimized aeration system design with active feedback control based on real-time measurements has allowed San Jose Water to maximize energy efficiency for their THM removal system. By modulating aeration as a function of THM concentration, and optimizing power usage, the utility will potentially save about $100K annually in energy while still achieving rigorous compliance goals.

8/30/2018, Room 205, 9:30:00 AM to 10:00:00 AM,

Presenter: Russell Deason, Mott MacDonald, russell.deason@mottmac.com

Title: The Devil is in the Details: Advanced Hydraulic Model Calibration for DC Water (Part 1)

Abstract: This presentation will be a detailed review of the extensive process DC Water went through to calibrate and update their existing water distribution model and produce an advanced, full-featured, calibrated, and future-proof base model. The new model can run an extended period simulation (EPS) “off the shelf” with SCADA controls and system specific diurnal patterns included. It can integrate with SCADA to import real-time, or actual historical boundary conditions. It integrates with DC Water's improved customer database (CIS) to import actual demand values from AMI data. This presentation will be given in two parts. Part 1 of the presentation will review the following: (1) Because spilling unknown quantities of water between zones will prevent the model from calibrating, confirmation of boundary valves status was required. Over 500 valves within the system were checked to confirm they were closed. (2) Temporary remote pressure recording sensors were installed at 75 locations throughout the system and more than 100 hydrant flow tests were performed to provide input data for the calibration. (3) Customer meters were incorporated into the model to represent all 130,000 customers. Utilizing hourly AMI data. Established system specific diurnal patterns were developed for various customer types and for the top ten individual customers. (4) Complete model inventory overhaul and synchronizing revised DC Water Enterprise GIS inventory into Hydraulic model. This process incorporated some new tools that will make future updates from the GIS much simpler. The GIS update required significant efforts including the elimination of skeletal piping, un-connected pipes, and hydrants ‘hanging’ in space The resulting hydraulic model will serve as a key decision-making tool for planning and operations across the enterprise. The extended-period calibration will help support the utility’s operational and water quality initiatives by providing the most updated estimates of demands and system pressures over time. The model is also used for shutdown planning, development impact, and pressure rezoning. Furthermore, generating the base hydraulic model from the GIS data will enhance and streamline the future hydraulic model update efforts. Note, this paper “Part 1”, which covers data collection and the GIS model build process, can be presented back-to-back with Part 2, which covers the hydraulic model calibration process in two 25-minute sessions or as a joint, longer presentation due to the extensive details, photographs and model screenshots used to illustrate the process undertaken to calibrate the model for extended period simulation. We recommend a back-to-back session on this project for Part 1 and Part 2.

8/30/2018, Room 205, 11:00:00 AM to 11:30:00 AM,

Presenter: John Van Arsdel, M.E. Simpson CO., Inc., john@mesimpson.com

Title: "The Impact of Proper Production Flow Metering on Water Audits"

Abstract: The AWWA free Water Audit Software has been a great tool for figuring out how much water and money is being potentially lost in a water system. The spreadsheet helps pinpoint where exactly the losses are occurring. However, this all starts with the verification of the total water production and input into the distribution system for the audit period. If the water production amounts for the audit period are incorrect, the results of the audit will also be incorrect. The basis for figuring out water loss starts with the making sure the total water system input is correct. Water management decisions based on inaccurate information result in frustration and ineffective use of resources. The volume of water supplied to the water system is the most important number in the realm of water loss accounting and the calculation of key performance indicators. This presentation will focus on water production verification for production/wholesale flow meters by on site analysis, flow testing, calibration and the overall effects water production amounts can have on the final outcome of the audit. Audit cases and illustrations of improper meter applications, calibrations and verifications will be covered as well as what happens when the incorrect amounts are entered into the spreadsheet. Certain flow meter testing pitfalls will be demonstrated along with the BMP's of large meter testing and calibration.

8/30/2018, Room 205, 11:30:00 AM to 12:00:00 PM,

Presenter: John Blondell, KCI Technologies, Inc., john.blondell@kci.com

Title: City of Bowie Pipe Bursting

Abstract: The City of Bowie, Maryland owns and operates a water and sewer utility serving 7,800 residents and 100 commercial businesses. The system which was installed in the 1960's includes approx. 90 miles of water distribution piping. While the 10-inch and larger pipes are concrete lined cast iron, most of the piping is six or eight-inch diameter, unlined cast iron pipe which has experienced significant corrosion problems. The most common corrosion problem is what is known as "tuberculation" which is the formation of small mounds of iron oxide (tubercles) inside the piping. Tuberculation accumulation over the past 50 years has reduced the hydraulic capacity of the pipes, and when high flows are experienced, suspended iron oxides discolor the water. The City selected KCI to design a "prototype pipe bursting project" in one of the most affected neighborhoods having very low flows. This particular section of six-inch main is approximately 830 feet long and serves 23 homes which are not "back-fed" by other water mains. The alignment extends beneath trees, asphalt roadways, paved driveways, sewer and gas easements, and a stream. This pipe bursting project replaced the existing 6-inch cast iron pipe with 8-inch diameter PVC pipe. Transitions were made to HDPE replacement pipe where sections traversed the crests of steep hills and the stream valley. The design effort was streamlined to utilize City GIS in lieu of preparing drawings based on topographic surveys. Key to the design effort was that there were no profiles for the existing water main. KCI dug test pits at the stream crossing to verify the absence of pipe fittings and/or concrete encasement which would potentially block the bursting head. The Contractor set up the water bypass, and dug entrance and exit pits at 500 foot intervals. A hydraulic bursting unit in the receiving pit threaded heavy rods back through the existing water main and connected to the bursting head at the end of the new pipe. The blades on the bursting head cut apart the existing cast iron pipe. An expander head then followed and pushed the pipe fragments out into the surrounding soil. The new 8-inch pipe was pulled behind the expander head into the existing soil. The system carried the new pipe past an existing gas main located within 14" of the water main at times, and beneath the stream with no environmental impacts. Eight water services were then reinstated after testing and disinfection. Although pipe bursting is a common trenchless approach for replacing sewer mains, the success of this project offered proof of concept for replacing the City's aging water distribution system while minimizing disturbance to the daily activities of the residents. Pipe bursting limits excavation, thereby reducing cost, shortens the design and construction schedules, and minimizes impacts to the environment and property owners. It may not be appropriate in all locations and must be evaluated versus other methodologies for constructability, efficiency and cost effectiveness. For the City of Bowie it is another tool in the toolbox in managing their aging assets.

8/30/2018, Room 205, 12:00:00 PM to 12:30:00 PM,

Presenter: Ismail Hanieh, Black & Veatch, haniehif@bv.com

Title: Emergency Condition Assessment and Evaluation of Existing PCCP Header

Abstract: The Washington Suburban Sanitary Commission (WSSC) is the 8th largest water and wastewater utility in United States, serving approximately 1.8 million residents in Montgomery and Prince George's County Maryland (suburban Washington D.C.). The Potomac Water Filtration Plant (WFP) is the larger of WSSC's two water filtration plants and was originally put on-line in 1962 with a current capacity of 288 MGD. The plant raw water supply is provided directly from the Potomac River and the raw water is pumped from an on-shore intake to the WFP by two raw water pumping stations. The Potomac Plant consists of conventional treatment with coagulation, tapered energy flocculation, dual media filters, UV filtration, pH adjustment, orthophosphate addition, fluoride addition, and chlorine disinfection. Following treatment in the plant process units, the finished water is stored in four finished water reservoirs and then pumped to two separate pressure zones. TAs part of the original plant construction, the Finished Water Pump Station (FWPS) within the Potomac Water Filtration Plant was designed to provide water for the two separate pressure zones. , Montgomery Main and High Pressure ZonWSSC recently completed a study (WSSC to Provide B&V with a copy of the study or more details on the business case) to investigate the need for upgrading various aspects of the Pplant, including an evaluation to determine what existing equipment and piping should be replaced. During the evaluation, several external cracks were discovered in on the coating of the a 24" and 36" PCCP header pipe piping inside the FWPS. This A separate study examined possible operational and failure risks of the pipe header. To evaluate the condition of the header, WSSC utilized its existing PCCP inspection and condition assessment contracts and mobilized a team (including B&V and PURE) to perform an emergency condition assessment of the header piping. The condition assessment required careful coordination between the Plant staff, the inspection contractor consultant and the condition assessment engineers to coordinate activities onsite. The condition assessment consisted of an external electromagnetic inspection and an external visual inspection of the pipe piping, pipe piping supports, and exposed thrust blocks. Following the onsite inspections, an engineering analysis was performed to determine the structural integrity of the piping, piping supports, e along with an analysis to determine if the existing thrust blocking is sufficient. This presentation will detail the inspection effort and subsequent engineering analysis. It will also include a discussion of the recommended rehabilitation methods.

8/30/2018, Room 205, 2:00:00 PM to 2:30:00 PM,

Presenter: PJ Crow, OBG, pj.crow@obg.com

Title: Practical Aspects of Implementing a PFOA/PFOS Treatment System for a 5-MGD Municipal Water Supply

Abstract: The City of Martinsburg's (West Virginia) Big Springs water source is contaminated with perfluoroalkyl substances (PFOA & PFOS) at levels exceeding the USEPA's Lifetime Health Advisory level of 70 ng/L. Consequently, the State Bureau of Public Health ordered the City to discontinue use of this water source until treatment is provided for PFOA/PFOS. O'Brien & Gere (OBG) was retained to perform pilot testing and concept level designs for alternative approaches that would remove the PFOA/PFOS. Following the pilot studies and concept designs, OBG was retained for final design, construction management and start-up services to be completed on an expedited schedule. This plan allowed for the City of Martinsburg to resume use of its primary source for public water supply via treatment at the modified Big Springs Water Treatment Plant (WTP). Construction was completed on an expedited schedule, with separate contracts for the pre-purchase of granular activated carbon (GAC) units, and general construction. The new 5 MGD PFOA/PFOS treatment system went into interim operation in November, 2017, approximately 9 months after beginning design, and is one of the largest installed to date in the United States. Raw Water Big Springs is a karst groundwater source, and contamination is attributed to the use of fire-fighting foams at a nearby Air National Guard Base. As is typical for karst groundwater sources, Big Springs is classified as "groundwater under the influence of surface water" and requires filtration. The City has an existing conventional surface water treatment plant, with coagulation, gravity filtration (dual media filters) and chlorine based disinfection. The existing plant is not suitable for PFOA/PFOS treatment. The raw water exhibits high hardness (over 400 mg/L as CaCO3), pH of 7.5 and low turbidity (typically 1 NTU or less). Total PFOA and PFOS concentrations are approximately 150 ng/L. Pilot Studies Pilot studies included rapid small scale column tests (RSSCTs) to confirm the effectiveness of GAC for the Big Springs source water. Bench testing was also performed to evaluate powder activated carbon (PAC) by simulating the addition of PAC to the existing flocculators at the Big Springs WTP. PAC was not implemented, and design proceeded utilizing GAC. Treatment The basis of design for removal of the PFOA/PFOS includes four pairs of 12-foot diameter GAC contactors piped in series, each with 10 minutes of empty bed contact time. The GAC contactors treat raw water upstream of the existing conventional treatment methods, with potable water used for backwash. This presentation will describe lessons learned and practical experiences in the expedited evaluation, design, construction and start-up of one of the largest drinking water treatment systems for PFOA/PFOS installed to date in the United States, including challenges associated with obtaining funding. The presentation will summarize the results of the pre-design testing, including the comparison of GAC and PAC for PFOA/PFOS removal, and key aspects of the design and procurement, including modification of the standard bidding process to consider schedule, and measures to reduce precipitation of CaCO3 in the contactors. RSSCT results will also be compared with full-scale operating results.

8/30/2018, Room 205, 2:30:00 PM to 3:00:00 PM,
Presenter: Russell Ford, Jacobs/CH2M, russell.ford@ch2m.com
Title: What Bugs Got to Do With It? - Starting up Biologically Active Filters for DBP Control
Abstract: Several papers have been given on the study and design of the Poughkeepsie's Joint Water Board's 19.3 mgd plant upgrade to ozone and BAC. The plant went operational in November 2016. This presentation will discuss some of the key startup issues associated with keeping a plant operational while starting up and testing out the new systems (ozone, BAC, CO2 feed system for pH control and centrifuges). In addition, in order to meet NYSDOH requirements, the plant has taken a significant amount of data on the maturation of their biological filtration process. This is one of the first plants in New York state to utilize BAC for DBP control. Over one year's worth of startup data will be presented to discuss how the filters became biological, reduced the DBPs leaving the plant by almost 50 to 90% depending on the season. This allowed the water plant to address DBP issues with both retail and wholesale customers that have distribution system detention times upwards of 5 to 7 days. Plant optimization included coagulation optimization, filter run time operations and ozone optimization. The presentation will also discuss some of the operational challenges of utilizing BAC and modifications that should be considered for plants in the future.

8/30/2018, Room 205, 3:00:00 PM to 3:30:00 PM,
Presenter: James Christopher, Tetra Tech, james.christopher@tetratech.com
Title: Investigating Alternative Strategies for Controlling DBPs in a Growing Utility
Abstract: The growth of communities and expansion of water service areas present unique challenges to drinking water distribution. Chief among these challenges are increasing water age and the formation of disinfection byproducts (DBPs). These challenges are more pronounced in larger inter-connected systems, where various drinking water supplies may be mixed. Common DBP control strategies, such as applying alternative disinfectants and organic matter reduction, have been vetted in previous studies. However, site specific factors and less widely applied control strategies must be investigated. A comparative analysis of common control strategies with more tailored approaches such as air stripping of trihalomethanes can help answer the question of whether one size fits all. Tetra Tech, Inc. is assisting a growing utility address disinfection byproduct (DBP) formation concerns in its distribution system. The distribution system is an interconnected system supplied by treated groundwater from three water treatment plants (WTPs). The plants employ a groundwater treatment scheme consisting of aeration for hydrogen sulfide removal, hypochlorination for disinfection, and fluoridation. The chlorine disinfectant reacts with the natural organic matter in the groundwater supply. As a result, the levels of regulated trihalomethanes and haloacetic acids have been approaching the regulatory maximum contaminant levels in locations with the highest contact times. To support a growing community, the utility is considering extending the service area for this system. A larger service area may increase system detention times, and in turn, DBP formation. Consequently, Tetra Tech conducted a study to identify and evaluate alternative strategies for controlling DBPs in the distribution system. Alternative treatment techniques, including air striping, activated carbon adsorption, and ion exchange, were evaluated at the bench-scale based on control effectiveness, probable costs, and distribution system water quality. The purpose of the presentation will be to: Provide an overview of DBP formation and control strategiesDescribe the existing plant conditions and the bench-scale experiments conducted to evaluate DBP control alternativesPresent the results from the bench-scale experimentsDiscuss conclusions and potential impacts on distribution system quality

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8/30/2018, Room 205, 4:00:00 PM to 4:30:00 PM,
Presenter: Mark Notheis, Jacobs/CH2M, mark.notheis@gmail.com
Title: Utilization of UV Disinfection for a 27 MGD WTF Upgrade to Meet Benchmarking Requirements for Giardia Inactivation/Removal
Abstract: In 2016 the City of Portsmouth embarked on the construction of a $38,500,000 treatment plant upgrade to their Lake Kilby WTF. The improvements consisted of optimizing the removal/inactivation of Giardia and to reduce the production of DBPs via new deep bed filters, the addition of UV disinfection, and the modification of the application points for ammonia. In evaluating the need for UV disinfection, a disinfection profile was prepared for the existing plant. This analysis was performed by reviewing two years of operating data for the plant under various plant flows, and free chlorine concentrations. The results of the analysis indicated the existing plant can currently achieve a free chlorine Giardia inactivation of 2.73 log. A 2.5 log removal credit for filtration for a total Giardia removal credit of 5.2 log. After the new plant upgrade is complete the Giardia disinfection strategy will be capable of providing a minimum of 6.0 log removal under critical high flow and low temperature conditions which exceeds the current 5.2 log Giardia removal under the existing process flow conditions. In addition to the new disinfection approach being more robust, it will also reduce the free chlorine contact time thus minimizing the formation of DBPs. Under the new disinfection strategy, a total of 4 UV reactors will be constructed to meet the plant demands. Due to space limitations and construction cost, it was determined the existing granular media filter space would be reapportioned to provide a new UV process area after the construction of the new deep bed filters. The construction is scheduled to be completed in October 2019. If this paper is selected for presentation the authors will discuss the disinfection benchmarking process, the design criteria for the new UV reactors, and provide a summary of the current construction and start-up activities.

8/30/2018, Room 205, 4:30:00 PM to 5:00:00 PM,

Presenter: Terence Bradley, City of Bowie, tbradley@cityofbowie.org

Title: "Chlorine Gas… a Safe and Efficient Choice?"

Abstract: Many public water treatment facilities across the country have switched over from the use of chlorine gas to sodium hypochlorite. For many water and wastewater utilities, the switchover is considered the safest option, as it eliminates the need to develop comprehensive Risk Management (RM) and Process Safety Management plans (PSM). The Occupational Safety and Health Administration (OSHA) has listed chlorine as a hazardous chemical. The use and storage of chlorine gas that meets or exceeds a threshold quantity of 1,500 lbs. requires the development and implementation of a PSM plan. In addition, the Environmental Protection Administration (EPA) also requires the implementation of a site specific RMP for utilities and industries that utilize and store chlorine gas in treatment processes. Also, there are additional safety related procedures that must be adhered to with the use of chlorine gas. For example, the staff of the water treatment plant must be trained to safely handle chlorine and must be prepared to respond to potential chlorine gas releases. In addition, plant personnel who work with chlorine must be included in respiratory protection programs and be trained in the use of self-contained breathing apparatus. A water utility decision to convert from chlorine gas to sodium hypochlorite (bleach) at a water filtration plant involves the thorough examination of the pros and cons of each disinfection product. From a budget point of view, the costs per gallon for hypochlorite compared to chlorine gas per pound can be three times the amount to achieve the same disinfection result. In addition, sodium hypochlorite can fluctuate in concentrations from as low as 10% to 12% available chlorine. The amount of sodium hypochlorite required for the disinfection process is significantly more compared with the use of chlorine gas. The infrastructure requirements for the switchover from chlorine to hypochlorite often involves the need to construct an additional building to the water plant to store the sodium hypochlorite and the metering pump equipment. On the safety perspective, many utilities make the change to hypochlorite based strictly on the safety aspects of the handling and storing of chlorine gas. It is important to take a comprehensive approach and examine all options in order to determine the most efficient, cost-effective and safest option for the disinfection process My presentation to the attendees will approach an example of how an aging chlorine gas feed system can be redesigned safely and efficiently. The City of Bowie Water Plant has maintained a chlorine gas pressure feed system since the start-up of the plant in 1961. After a careful review of the modifications and construction necessary to convert to sodium hypochlorite, the decision was made to implement safety enhancements to the existing chlorine gas system. By reducing the chlorine gas storage, installing direct mount vacuum gas regulators and instituting safe work practices, the modifications have proven successful. Our goal of insuring the safety of the surrounding community and safety for our plant personnel has been accomplished.

8/30/2018, Room 205, 5:00:00 PM to 5:30:00 PM,

Presenter: Christina Alito, HDR, christina.alito@hdrinc.com

Title: Optimizing Ozone Application for Enhanced Taste and Odor Removal and Reduced Disinfection Byproduct Production

Abstract: The presence of influent organics can create a burden on water treatment systems striving to reduce recalcitrant organics, such as taste and odor (T&O) compounds. T&O issues are commonly attributed to algal by-products, geosmin and 2-methylisoborneol (MIB), above the taste and odor threshold (4 to 10 ng/L). Utilities nationwide have implemented ozone processes to breakdown large-chain, recalcitrant organics into smaller molecular weight compounds. Ozone can also create assimilable organic carbon (AOC); easily biodegradable organics that can be removed through biofiltration. Still, the benefits of ozone application must be balanced with downstream challenges, like biological fouling of filters, decreased distribution system biological stability, and the formation of disinfection byproducts, such as bromate and N-nitrosodimethylamine (NDMA). Two studies were initiated to characterize the potential benefits and challenges with ozone implementation. The primary objectives were to determine the optimal ozone doses and complementary optimization strategies (such as peroxide or chloramine addition) for challenge mitigation. First, bench-scale ozonation tests were carried out on raw and settled water from a utility in North Texas that has experienced T&O events. Results showed that 4 mg/L of ozone coupled with 1.2 mg/L of peroxide reduced T&O by up to 95% within 4 minutes of application. Bromate formation was suppressed below the MCL of 10 ug/L when a chloramine residual greater than 1 mg/L was used. Second, full-scale optimization was completed at a utility in Northern Virginia to determine the ideal peroxide dose coupled with ozone to reduce excess biological growth that impacted hydraulic performance of the downstream biofilters. Headloss accumulation was reduced by up to 42% when 1.5 mg/L of peroxide was fed with 1.5 mg/L of ozone. This presentation will provide additional background on ozone challenges, the evaluation of ozone application, test results with preliminary design criteria, and the nuances that come with implementing ozone.

8/30/2018, Room 206, 8:30:00 AM to 9:00:00 AM,

Presenter: Josh Weiss, Hazen and Sawyer, jweiss@hazenandsawyer.com

Title: Improved Drought Planning in the Chesapeake Bay Region: Case Study of the Baltimore Water Supply System

Abstract: It is exceedingly difficult to foresee the onset of a drought, and once in place, difficult to identify the end of a drought with enough lead time for effective management decisions. Further, management responses can be difficult and costly to implement, and often are not taken quickly for fear of initiating actions that will prove both costly and unnecessary. Climate change predictions generally indicate warmer, wetter conditions for the Mid-Atlantic and Northeastern United States with an increased frequency of extreme events. Generally wetter conditions do not preclude the occurrence of severe droughts, exacerbated by increased growth in the region's major population centers. Further, studies have indicated that this region could be particularly sensitive to changes in seasonal precipitation patterns under climate change due to the lack of sufficient storage capacity to capture water during more severe rainfall events that occur over a shorter duration. Given the ongoing potential for severe drought in the Chesapeake Bay region; future uncertainty due to climate change and population dynamics; and the economic and environmental value of the Susquehanna River Basin, our team developed a Drought Planning Tool (DPT) for the Susquehanna River Basin that processes common hydrologic and climatological indicators for input to a water supply system simulation model. Particularly for regional systems with direct and indirect interconnections among water users, early warning of dry conditions is critical to proactively managing allocations among users. These systems may require a more complex triggering method, utilizing several indicators or a statistically based index, and involving comparisons between forecasted supply and demand. In this presentation, we will describe the DPT in the context of a case study evaluation of alternative, proactive drought triggers and operations for the City of Baltimore's water supply system. This case study demonstrates how the DPT can be used by Basin stakeholders to develop robust, proactive drought plans that leverage system flexibility in seeking to balance water supply reliability, water quality, and environmental objectives under a wide range of hydrologic conditions. Proactive drought triggers considered in these case studies include common hydro-meteorological indices, general supply system indicators (reservoir storage, reservoir rule curves), demand projections, and hydrologic forecasts. The DPT provides a framework for developing and applying quantitative drought predictions for regional-scale drought planning, emphasizing use of early warning triggers for proactive drought impact mitigation measures.

8/30/2018, Room 206, 9:00:00 AM to 9:30:00 AM,

Presenter: Christopher Pomeroy, AquaLaw PLC, chris@AquaLaw.com

Title: HRSD's SWIFT Project: Process, Benefits, Oversight and Implementation

Abstract: This presentation will provide an overview of the Hampton Roads Sanitation District's (HRSD) Sustainable Water Infrastructure for Tomorrow Project (SWIFT), its multiple benefits, and related regulatory and non-regulatory oversight and implementation mechanisms. SWIFT is an innovative water treatment initiative in eastern Virginia designed to ensure a sustainable source of groundwater while addressing environmental challenges such as Chesapeake Bay restoration, sea level rise and saltwater intrusion. This multi-year initiative will take already highly-treated wastewater (that would otherwise be discharged into the Elizabeth, James or York rivers tributary to the Chesapeake Bay) through additional advanced water treatment to produce drinking quality water. This SWIFT Water will then be treated to match the existing groundwater chemistry and added to the Potomac Aquifer, the primary source of groundwater throughout eastern Virginia. A key benefit of this effort is that it will practically eliminate HRSD's discharge into the James, Elizabeth and York rivers, which are tributary to the Chesapeake Bay. HRSD will only need to discharge clean water through existing permitted outfalls into these rivers during periods of extremely high flows that occur occasionally during significant storms. More broadly, SWIFT is designed to (1) help the Bay by significantly reducing the amount of nutrients such as nitrogen and phosphorus that HRSD discharges to the James, Elizabeth and York rivers; (2) replenish dwindling groundwater supplies to allow this natural resource to remain productive for generations to come; (3) fight sea level rise by reducing the rate at which land is sinking in the Hampton Roads region; (4) protect groundwater from saltwater intrusion due to a shrinking aquifer; and (5) support the economy by providing businesses with the water they need to operate. This presentation will include an overview of the applicable oversight mechanisms including regulatory and non-regulatory components. In addition to the permitting regime, this portion of the presentation will address non-regulatory aspects of the SWIFT Project. One focus area will be cross-sector nutrient credit trading with HRSD's member jurisdictions to address numeric nutrient reduction requirements applicable to Municipal Separate Storm Sewer Systems (MS4s). Another focus area will be an innovative oversight mechanism adapted from the highly successful Occoquan Watershed Monitoring Laboratory experience that is planned to include an oversight committee of various stakeholders and a related monitoring laboratory housed within a public university.

8/30/2018, Room 206, 9:30:00 AM to 10:00:00 AM,

Presenter: Srikanth Gorugantula, HDR, srikanth.gorugantula@hdrinc.com

Title: Improving Coastal Resiliency after Superstorm Sandy - Spring Creek Hazard Mitigation Project

Abstract: The New York State Department of Environmental Conservation (NYSDEC) has been awarded a grant from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) (application 4085-0005) for the implementation of Coastal Storm Risk Management (CSRM) measures at Spring Creek South. NYSDEC, U.S. Army Corps of Engineers (DEC's Management Contractor), National Park Service (landowner) and FEMA are working together to restore Spring Creek South, providing CSRM and ecosystem benefits to the Howard Beach community within Jamaica Bay. The Spring Creek site is located within the borough of Queens, New York. The site was filled in with millions of cubic yards of dredged material during the first half of the 20th century to create developable land but instead served as a sanitary landfill for 30 to 40 years. These past actions profoundly degraded the salt marsh community and habitat at Spring Creek. The site currently contains marsh, dune, grassland, and secondary woodlands that are dominated by invasive vegetative species (e.g., common reed). During Superstorm Sandy tidal surge reached approximately 6 feet above the ground level and damaged approximately 2000 structures (residential homes, businesses, schools etc.). The primary purpose of this coastal resilience project is to mitigate damages to the community by recontouring and repurposing more than 235 acres of land. An important design feature is a 19-foot (NAVD88) berm to further attenuate wave impacts during coastal storm events. Nature-based features such as low and high marsh, freshwater and tidal wetlands, and living shorelines are proposed components of the mitigation project. As a part of this presentation, Sea Level Rise Analysis, and Coastal Storm Surge Modeling that are being performed will be presented. Two separate models were applied for this study: the Estuarine, Coastal and Ocean Model (ECOM) for 'typical' tidal conditions, a 3-D proprietary model developed by HDR, and the MIKE21 for the 100-year coastal surge conditions. An overview of the data collection (tidal current and water level information), overview on model methodology, existing and future conditions scenarios and modeling results will be presented. Wave overtopping and inundation area results along with areas that are vulnerable to erosion based on wave heights and run-up values will be discussed.

8/30/2018, Room 206, 11:00:00 AM to 11:30:00 AM,

Presenter: Ahmad Habibian, CDM Smith, habibiana@cdmsmith.com

Title: Identifying, Prioritizing and Addressing Lifeline Infrastructure Resilience Gaps

Abstract: Resiliency of critical lifeline infrastructure has emerged as an important concern after recent disasters crippled the U.S. infrastructure which stranded many without basic utility services. System resiliency is often defined as the ability of the system to return to its original level of service in a short period of time. This presentation will provide an overview of the six primary dimensions of addressing infrastructure resiliency and will illustrate how these six dimensions can be utilized to develop a streamlined process of achieving infrastructure resiliency. Identification and characterization of potential hazards a utility faces constitutes the first dimension. The second dimension addresses the criticality of assets and develops a portfolio of assets which are essential to maintaining a basic level of service. The third dimension explores the utilization of innovative and smart technologies for infrastructure vulnerability assessment and monitoring. Assessing existing critical infrastructure against identified hazards and identifying resiliency gaps is the fourth dimension which must be addressed. Infrastructure interdependencies where the failure of an asset can have cascading effects and cause the failure of other assets constitutes the fifth dimension. Including system interdependencies is not possible without engaging stakeholders. Identifying sources of funding and exploring the requirements for securing such funding for implementation constitutes the sixth dimension. These six dimensions form the backbone of a process for assessing, prioritizing and addressing infrastructure resilience gaps. This process will culminate in the development of an implementation plan which must be executed to achieve the improvements necessary to address resilience gaps. To enhance the understanding of the concepts formulated in this paper, real world examples will be included for illustration purposes.

8/30/2018, Room 206, 11:30:00 AM to 12:00:00 PM,

Presenter: Charlotte Daigle, Jacobs, charlotte.hays@ch2m.com

Title: Be Prepared: Incorporating Climate Resilience and Mitigation Planning into Asset Management for a Water and Wastewater Utility

Abstract: As our changing climate produces storms of increasing intensity, magnitude, and frequency, such as Hurricanes Harvey and Irma of 2017, local utilities are assessing their vulnerability to these extreme events and adapting their infrastructure and procedures to continue to provide sustainable service to their customers. This presentation highlights a case study of how a local water and wastewater utility is integrating climate change resilience planning into their existing asset management system. Washington Suburban Sanitary Commission (WSSC), a water and wastewater utility located in suburban Maryland outside Washington, D.C., is currently conducting a long-term planning project to prepare for future climate change. This project has included the development of a range of potential climate scenarios for their service area; modelling of future coastal and riverine flooding near their facilities; assessment of the vulnerability of their existing infrastructure (3 raw water reservoirs, 2 water filtration plants, 6 wastewater treatment plants, and thousands of miles of pipe network); development of adaptation strategies for their assets-at-risk; and a greenhouse gas (GHG) inventory and action plan for their entire organization. This case study will present the methodology and results of the vulnerability assessment and flood adaptation analysis for WSSC facilities completed to date, which include pump stations and wastewater treatment plants. This analysis incorporates the probability of failure for the assets-at-risk based off the previously developed climate projections and applies the cost of replacement for each asset to assess the cost/benefit of implementation of the various adaptation strategies. In addition to assessing and protecting existing facilities, this project is developing design guidelines for new and retrofit projects that incorporate protection against the effects of climate change. All adaptation planning is being completed in tandem with continued GHG mitigation strategy implementation and monitoring.

8/30/2018, Room 206, 12:00:00 PM to 12:30:00 PM,

Presenter: Grant Davies, AECOM, grant.davies@aecom.com

Title: Flood Mitigation For Critical Facilities

Abstract: Historically, public infrastructure facilities have been protected to the 100-year flood elevations. The U.S. Environmental Protection Agency (EPA) requires publicly owned treatment works (POTWs) to meet this flood protection criterion. Through the National Flood Insurance Program (NFIP), FEMA provides regulatory flood maps for flood insurance purposes and provides recommendations for flood protection. FEMA categorizes POTWs as “critical” infrastructure and recommends protecting “critical” infrastructure from the 500-year flood event. Super-Storm Sandy on October 29, 2012 caused major damage along the New York - New Jersey coast line and resulted in significant flooding of facilities that were protected against a 100-year event. The storm surge in New York City produced by this event was about 1 foot higher than the 100-year flood elevation. The largest POTW in New Jersey was inundated by Sandy and was out of service for about one week before power and primary treatment were restored. It took several months to restore full treatment. The authority is now is implementing protection of the plant for the 500-year event. As a result of this storm and resulting extensive damages the federal government and several states have strengthened guidance for flood protection with the creation of the Federal Flood Risk Management Standard for federally funded projects. The standard provides options for establishing the minimum elevation that facilities should be protected: 1) two or 3 feet of elevation (depending on the criticality) above the 100-year, or 1 percent-chance, flood elevation, or 2) the 500-year, or 0.02 percent-chance flood elevation. DC Water is implementing a plan for a permanent flood wall protecting the facility from the Potomac River against a 500-year flood condition including wave action. Construction of the first segment of the proposed flood wall was completed. The completed segment contains two bulkhead gates in the roadway at the connection of the wall and existing concrete structures. In the interim period before the permanent wall is constructed, DC Water has chosen to construct temporary flood walls to protect the plant above the 100-year flood plain. The temporary wall segments will provide protection for the entire plant using bin blocks, which can be removed when the permanent wall is constructed. DC Water maintains flood insurance coverage for the plant. The current policy is based on the facility being located within the FEMA regulatory 100-year flood plain. If flood protection were provided above the 100-year floodplain with the required 3 feet of freeboard, it may be possible to submit Letter of Map Revision (LOMR) to FEMA requesting that the facility be removed from the regulatory floodplain. If FEMA approves the LOMR request, the flood insurance premiums would decrease. Avenues for flood waters to impact POTWs include overland, backwater through outfall conduits, backwater through storm drainage conduits, ground water surging above floor elevations, faulty isolation gates or valves isolating process facilities, inadequate freeboard from outfalls, flow in excess of process facilities. Flood mitigation strategies for each of these avenues will be discussed.

8/30/2018, Room 206, 2:00:00 PM to 2:30:00 PM,

Presenter: Mark Babbitt, DC Water, mark.babbitt@dcwater.com

Title: Agency Requirements and Permit approvals in Washington DC region.

Abstract: The purpose of this presentation is to review lessens learned in obtaining regulatory approval in the Washington DC region. The DC Region is a convoluted matrix of stakeholders and their requirements are not always inline with each other, Come enjoy the review of some of the more interesting DC Water projects and how the permit/permissions matrixes were/are navigated. With the increased construction activity and ever evolving regulations we will review three major projects presently underway at DC Water and the effort to obtain permits and permissions to complete the design and construction on time and in budget. The session will cover proper planning and scheduling to meet the overall project needs and how and when to start engaging the multiple agencies required for approvals. This will include but not limited to National Park Service, Army Corp of Engineers, District Department of Transportation, District Department of Energy and Environment and The Department of Regulatory and Consumer Affairs. Over the past year DC Water Interagency team has obtained 146 construction permits including sediment control and storm water management, 125 Occupancy permits, 6 Army Corp Permits, and numerous emergency work authorizations. In addition, the DC Water Interagency team is presently working with NPS on 3 NEPA approvals. Come on in, it will be FUN!

8/30/2018, Room 206, 2:30:00 PM to 3:00:00 PM,

Presenter: Dana Cooper, Cooper Moores, LLC, dana@coopermoores.com

Title: Whatever Happened to the Lead & Copper Rule Revision?

Abstract: We are now three years beyond when the Flint water crisis thrust the Safe Drinking Water Act's Lead and Copper Rule into the national spotlight. In the last three years the general public's interest has moved on to more sensational topics, but the process of revising the Lead and Copper Rule (LCR) has, gradually, continued. If and when the LCR is finally revised the impact on water utilities could be enormous. The presentation will first look at a brief history of the LCR with some of the legal mechanics of the federal rulemaking process made accessible for an audience of engineers. The presentation will then move to a summary of the federal, state, and advocacy organization responses to the Flint water crisis, and how that influenced the process to revise the LCR. The EPA's efforts to revise the LCR are ongoing, and the presentation will track recent developments over the last two years and up to the date of the conference, including an analysis of how federal politics and the Trump administration's priorities are impacting the issue. If a revised rule has not yet been published by the date of the conference, the presentation will provide information on what potential revisions might look like and how they would impact water utilities. If the revised rule is publicly available, the presentation will break down its provisions and explain the changes water utilities will have to make as a result.

8/30/2018, Room 206, 3:00:00 PM to 3:30:00 PM,

Presenter: Andrea Netcher, Tetra Tech, andrea.netcher@tetratech.com

Title: A Framework for Regulating DPR - Results from a Pathogen Benchmarking Study

Abstract: Virginia, Florida, Texas, and California have been leaders in innovative reuse applications through surface water augmentation projects (SWAPs), groundwater replenishment reuse projects (GRRPs), direct potable reuse (DPR) projects, and unrestricted public access reuse for irrigation. Concerns over water scarcity in each state are driving increased interest in development of regulations for raw water augmentation projects. The occurrence and concentration of pathogens, including enteric viruses, Cryptosporidium, and Giardia, are among the most important data sets needed to help guide the development of regulations. Although past studies have evaluated pathogens in Florida reclaimed water from the perspective of unrestricted public access reuse for irrigation (York et al. 2002[1]; Slifko and Gilliam 2004[2]), only a handful of pilot studies have evaluated pathogen data from the potable reuse perspective (MacNevin 2016[3]). Therefore, developing regulatory criteria for raw water augmentation will require a broader and more comprehensive survey that uses current pathogen data. This paper will present the results from a new pathogen benchmarking study that investigates the occurrence of protozoa in Florida reclaimed waters from the Florida Department of Environmental Protection's (FDEP) large pathogen database (2002-2017). The database if one of the largest datasets comprising more than 6,500 pathogen data points. Florida's reuse rules require certain domestic wastewater treatment plants to monitor for the protozoan pathogens, Cryptosporidium and Giardia and report the results to FDEP. [1] York, D.W., L. Walker-Coleman, and P. Menendez. 2002. "Pathogens in Reclaimed Water: The Florida Experience." Proceedings of Water Sources 2002, Las Vegas, NV, AWWA and WEF. 2002. [2] Slifko, T. and Gilliam, A. 2004 "Occurrence, Removal, and Risk of Pathogens in Reclaimed Water." AWWA Annual Conference and Exposition. [3] MacNevin, D. 2016. "Where Wastewater Ends and Water Treatment Begins: Evaluating the Viability of Potable Reuse" WateReuse Research Conference. Denver.

8/30/2018, Room 206, 4:00:00 PM to 4:30:00 PM,

Presenter: Chuck Lacey, Jr. PE, LB Water, chuck.lacey@lbh2o.com

Title: Smart Cities - Utilizing the Internet of Things to Improve Service

Abstract: This presentation will focus on the future of cities/towns and how they can meet the ever-increasing demands that are being placed infrastructure. From non-revenue water, to intelligent streetlighting, many towns are discovering how to use the Internet of Things (IoT) to improve the services they deliver and optimize the services they provide. This session will provide a brief history of the internet and how we got to where we are today, followed by a detailed discussion of how the internet of things can be used to improve the services a town or city provides. Two specific areas that will be discussed include non-revenue water and intelligent streetlighting. Time will be provided for Q&A to enable attendees to explore other areas of interest such as; smart parking, smart trash, automated metering Infrastructure (AMI), smart parking, smart trash, etc.

8/30/2018, Room 206, 4:30:00 PM to 5:00:00 PM,

Presenter: Manreet Ludhar, Louis Berger, mxludhar@baltimorecountymd.gov

Title: How data Management aids in decision making process for Baltimore County!

Abstract: Data Management is the function of planning, controlling and delivering data and other information effectively in an organization. Making the right decision is hard. Organizations have to frame the questions properly and find the right data to support the analysis and help in the decision making process. The first step of data management is to identify the data sources and problems correctly and then using high tech abilities to output the information so that it helps the county engineers. Baltimore County has several off the shelf databases which stores the information regarding CCTV, Cleaning, Scheduling, Sewer Repairs, Basement Backups, Sanitary Sewer Overflows, SLRAT, and Contract Management. All the work is done within the county system and the data is collected from the field. The information from these databases is retrieved and is used to build the automated reports which helps in various aspects of decision making like work order creation and distribution, budgeting, scheduling and project management. The data is then linked to the Baltimore County's GIS to spatially show the information and manage the projects. The reports are built using native programming languages such as SQL, R and python. The reporting system is set up dynamically as it queries the data every day from the systems and outputs in the form of excel which gives the end users the ability to track their projects in an efficient manner.

8/30/2018, Room 206, 5:00:00 PM to 5:30:00 PM,

Presenter: John Smith, Engineering Design Technologies, Inc., john.smith@edtinc.net

Title: Advancements in Cathodic Protection Technologies

Abstract: Since 1824 when Sir Humphry Davy first proposed the idea of installing blocks of iron below the waterline of copper-clad British warships to prevent corrosion until the 1960s, the cathodic protection industry has grown but has seen few technological improvements as compared to the past fifty years. Recently, the science and technology for the investigation and protection of our infrastructure has been rapidly evolving. The basics may remain the same but the application of new digital technologies, the use of drones, GIS, new field investigation equipment such as the 'Spectrum XLI' and modern design science is providing a new paradigm for the utility design engineer. Recent experience has shown that due to the technological advances in the coating and cathodic protection industry engineers and decision makers have more effective and cost saving techniques available. This presentation will highlight the new technologies and materials (including a discussion of coatings) being used in the field of cathodic protection design. The discussion will address the use of new materials such as PVC/HDPE pipes, zinc-coated pipes, polyethylene encasement (polywrap), fusion bonded coatings, and improvements to impressed current cathodic protection systems. Examples and their application will be provided. This presentation will be valuable to design engineers, utility managers and decision makers in the utility industry. Included in the discussion will be several local, Mid-Atlantic case studies where the technologies presented were used.

8/31/2018, Room 201, 9:00:00 AM to 9:30:00 AM,

Presenter: Sarah Marek, KCI Technologies, Inc., sarah.marek@kci.com

Title: Right-Sized Strategic Asset Management Planning for Small Water/Wastewater Systems

Abstract: Strategic asset management planning is a significant initiative for a water or wastewater system and takes a highly committed team of stakeholders and subject matter experts to realize success. Many pieces must fall into place along the way to include completion of an asset inventory, asset assessments (condition and consequence), O&M considerations, and sometimes difficult or sensitive discussions about budgets, CIP, and long-term funding. The final plan must reflect the future goals as well as the financial realities facing the system and provide a clear roadmap for implementing tactical asset management activities at an appropriate scale (right-size) that is reasonable and achievable in the long-term. Right-sized strategic asset management plans are especially important for small systems with limited staff, resources, and budgets. This presentation will explore practical methods and insights for scaling strategic asset management plans to the needs and realities of small water systems. The presentation will describe practical methods to address common questions that arise during the development of strategic asset management plans such as: “What level of service can my small system support?”; “Why do I need to define level of service if my small system has no major issues or complaints?”; “What lifecycle management strategies are appropriate given limited staff and budget?”, and “How can I facilitate asset condition assessments with minimal disruption to daily routines?”. Methods discussed will include the use of small system benchmarks for setting level of service goals and protocols for pairing condition assessments with routine maintenance activities, among others. The presentation will also include a description of a GIS-model-based method developed by KCI that provides a simple yet cost effective way to score the likelihood and consequence of failure of pipe; both critical measures needed for risk evaluation.

8/31/2018, Room 201, 9:30:00 AM to 10:00:00 AM,

Presenter: Steve Bian, DC Water, steve.bian@dcwater.com

Title: DC Water At Work: Time-proven best management practices (BMP) when building near buried linear assets

Abstract: In the nation’s capital some of the oldest trunk sewers and interceptors were built from the 1870’s through the 1920’s with masonry arches made from a combination of bricks, stones, and later non-reinforced plain concrete without modern day steel reinforcements. With a net population increase of 50,000 in this small district comes a booming real estate market and major infrastructure developments: streetcar, two stadiums, and three bridges across the Anacostia River, and many residential structures. Often these project have deep foundations alongside the century old buried infrastructure. DCWATER Permitting Operation and Department of Engineering and Technology Service (DETS) are at the forefront of protecting these mission critical century old assets of indefinite life, actively managing the forthcoming impacts by collaborating with stakeholders and enforcing the best geo-structural practice in design and construction, thus protecting both the District’s infrastructure and the proposed new structures both now and in the future. Enabling ongoing maintenance along with a vision towards future expansion. This presentation will showcase a few recent projects and their impacts which lead DC Water to enhance criteria for SOE and demonstrates that DCWATER’s instituted best management practices have a win-win-win result for both the environment, the contractor and the rate-payer.

8/31/2018, Room 201, 10:00:00 AM to 10:30:00 AM,
Presenter: Morgan Brown, WRF, mbrown@wef.org
Title: Utility-University Collaborative Partnerships
Abstract: In a 2007 editorial in Water Environment Research, Dr. Krishna Pagilla succinctly summarized the benefits of university-utility collaborations, stating “Applied research in water and wastewater conveyance and treatment is critical to address many short-term problems encountered by utilities and identify longer-term research needs and fundamental issues. Universities local to utilities have a great role to play in conducting such applied research and developing site-specific solutions to technical problems. A university–utility collaboration is a win–win combination for both and has synergistic benefits in terms of technical problem solving directly applicable to utility operations and training future professionals for the same utility.” The Leaders Innovation Forum for Technology (LIFT) program, jointly administered by the Water Environment Federation (WEF) and The Water Research Foundation, has a focus area on encouraging university-utility partnerships (UUP). To communicate the best practices, challenges, and successes of UUPs, WEF will be releasing a guidance document in early 2018 with support from the International Water Association (IWA) and the Association of Environmental Engineering and Science Professors (AEESP). This presentation will give attendees an in depth look at some of the material found in this guidance document, including information on general characteristics of successful partnerships, how to build and maintain relationships, dealing with distance, and risk management. Case studies examples of successful UUPs will also be shared. Throughout the UUP case studies that are highlighted in the WEF guidance document, ideal characteristics of utilities, universities, and implementation structures that help create successful UUPs were identified. It includes overarching themes that utilities and universities need to keep in mind when forming partnerships to help manage expectations and realistically match university capabilities with utility needs. Building and maintaining relationships are perhaps the most important aspect of UUPs. These partnerships are not project based, but rather are based on relationships and the projects then follow. The UUP guidance document discusses a number of suggestions to help utilities and universities initiate the first connection, develop the first engagement, and maintain relationships. Distance is another important consideration when establishing UUPs. Geographically related partnerships are the most common, as the utilities and universities located nearby generally face the same issues with respect to climate, natural resources, etc. In addition, the co-location provides opportunities to strengthen the critical interpersonal relationships. However, opening a partnership to organizations around the world can lead to a greater alignment of needs, as it is more likely to find matching interests when looking at a larger potential group. Guidance on both local and long-distance partnerships will be included. Risk management needs to be addressed when forming UUPs, especially since utilities tend to be very conservative when it comes to this topic. The three important aspects of risk management covered in the UUP guidance document are finance, intellectual property, and public outreach. Overall, this presentation will provide guidance on how to overcome common problems that occur when establishing UUPs, and discuss examples of successful partnerships. The hope is that attendees will leave feeling more confident in starting their own partnerships.

8/31/2018, Room 201, 10:30:00 AM to 11:00:00 AM,
Presenter: Robert Ryall, Arcadis, robertryall@yahoo.com
Title: Concerns and Considerations in Customer Affordability
Abstract: As funding of aging infrastructure replacement become a critical issue for water and sewer utilities, systems are facing increased pressure on user rates. Affordability of water and sewer service continues to be a critical topic for utilities. The US EPA and rating agencies have provided guidance on “affordable” levels of water and sewer bills, generally based on Median Household Income (MHI) levels. However, there are challenges with MHI as a benchmark for Affordability including: Limited correlation between MHI and poverty and ability to pay, MHI does not consider income distribution, Renters and residence of public housing authorities general do not pay water and sewer bills, Bills for low income households reach thresholds before median income households. With a trend of increasing water and wastewater pricing, Affordability has become an important topic facing service providers. This webinar will focus on Affordability challenges, solutions, and how utilities are incorporating MHI within customer assistance programs. As a result of this presentation, the audience will learn: Why Affordability is an important industry issue, How Affordability is defined, How Affordability is measured, Challenges associated with Median Household Income, A case study providing practical application of MHI thresholds, Overview of available Affordability related resources

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8/31/2018, Room 201, 11:00:00 AM to 11:30:00 AM,

Presenter: Devang Prajapati, Mott MacDonald, devangprajapati1979@gmail.com

Title: Customer Service or Risk Management: DC Water offers to install pressure reducing valves in more than 1,700 homes

Abstract: DC Water is installing more than 1,700 residential pressure reducing valves (PRVs) in homes of eligible residential customers. This is part of the Anacostia 2nd High Pressure Zone Improvement Program which was initiated in 2001 to address long-standing low-pressure issues in southeast DC. Over a period of almost two decades, a new pumping station, rehabilitation and installation of new transmission mains, and the St. Elizabeths Tower were designed and built to create a new service area, Anacostia 2nd High. When completed, pressure will be increased by 22 pounds per square inch (psi) across the new service area, which will also increase fire flow throughout the zone. The District of Columbia Plumbing Code requires a residential PRV to be installed if the internal plumbing of any building is exposed to pressures above 80 psi. DC Water identified more than 1,700 homes and other buildings within the service area that will likely experience water pressure above 80 psi following the implementation of the pressure increase. As DC Water's actions will push these residents out of plumbing code compliance, a combination of risk management and customer service priorities resulted in DC Water's decision to offer to purchase and install PRVs at no cost to eligible residential customers. The Anacostia 2nd High Residential Pressure Reducing Valve Installation Project was established to install these free PRVs. Design efforts for the project involved establishing processes and organization for 1) identifying and signing up eligible customers, 2) setting up appointments, 3) permitting, 4) onsite assessments, and 5) installation. Parameters for eligibility for the no-cost PRV, the extent of work that can be performed with the installation, the number of opportunities to be provided, etc. were established to balance risks and costs. By increasing program features, giving increased flexibility to customers for scheduling appointments, and increasing the extent of work that can be performed in the residences, DC Water can increase participation and reduce risk exposure to customer complaints and litigation for failed plumbing. Lessons learned from a similar project recently completed by DC Water in a different pressure zone were instrumental in designing this approach. Educating DC Water's customers about the effects of the upcoming pressure increase has been crucial to our efforts, and an extensive public outreach effort was designed and executed to: · Encourage participation from the >1,700 customers who are eligible for the PRV. · Educate the >5,000 customers who will receive the benefits of higher pressure to prepare their plumbing for the pressure increase. Initially, a project website, hotline, email address, public meetings, outdoor block meetings, presentations at Ward 8 Advisory Neighborhood Commission meetings, and multiple mailings were implemented to attempt to secure participation. This was followed up by scripted phone calls, robocalls, email blasts, additional reminder mailings, and finally, door-to-door visits. This paper will discuss the challenges and lessons learned from the planning, design, public outreach, and construction efforts for this project.

8/31/2018, Room 202, 9:00:00 AM to 9:30:00 AM,

Presenter: Lee Tharps, CH2M/Jacobs, Lee.Tharps@CH2M.com

Title: Novel Use of In-basin Inclined Plate Settlers for Secondary Clarification in a DBO Two- Stage Activated Sludge Upgrade at the Woonsocket WWTF

Abstract: In June 2012, the City of Woonsocket selected CH2M to perform design-build of its wastewater treatment facility. A key objective was to reduce nitrogen and phosphorus loads to the Blackstone River to meet new monthly requirements of the Rhode Island Department of Environmental Management - an average effluent of 3.0 mg N/L total nitrogen and 0.1 mg P/L total phosphorus. A two-stage activated sludge approach was determined to best meet the project goals for nitrogen removal. The first stage bioreactor is a low-sludge-age activated sludge basin. The second stage bioreactor is used to polish the effluent with supplemental carbon (as needed) added to achieve the nitrogen removal goals and ferric chloride for phosphorus removal. A reconfiguration of the existing bioreactor tankage on-site to achieve the two-stage activated sludge process within the existing tankage was deemed to be the most cost effective approach to achieve the required process changes. Inclined plate settlers were installed in the downstream end of the first stage basins to provide clarification for the first stage. The existing secondary clarifiers were used for the second stage clarification. The relatively low mixed liquor concentration in the first stage bioreactor makes this approach particularly effective as the solids loading are well within the acceptable range for a plate settler. During construction, the facility operated with just two first stage basins and the associated plate settlers. During this period an SRT of 7-10 days was targeted to meet a discharge limit of 5 mg/L NH3, resulting in observed average solids loading rates (SLR) on the plate settlers of approximately 10 lb/d-sf and effluent TSS values of 10 - 20 mg/L. During facility acceptance testing, the average first stage MLSS was 1,100 mg/L and the effluent TSS was 14 mg/L which is well below the predicted effluent TSS of 20-60 mg/L. Purpose The novel use of plate settlers The upgrade of the Woonsocket WWTF through the DBO process, provided the City of Woonsocket significant capital and operating cost savings. The innovative use in-basin plate settlers to reduce space utilization and reduce costs has exceeded performance expectations and provided operational experience for using in-basin plate settlers in a activated sludge system.

8/31/2018, Room 202, 9:30:00 AM to 10:00:00 AM,

Presenter: Elik Livay, Gannett Fleming, Inc., elivay@gfnet.com

Title: Federal Wastewater Treatment Plant Showcases Sensitive Design

Abstract: A new wastewater treatment plant (WWTP) at the Defense Distribution Susquehanna (DDS) Installation offers a forward-thinking example of how to efficiently meet wastewater management needs while minimizing environmental impacts. A new WWTP for the DDS Installation, in New Cumberland, Pennsylvania, was desperately needed. The existing facility, built in the 1960s, featured a patchwork of repairs. Its Oxigest steel tank was corroded and at risk of failure, which would discharge raw sewage into the Susquehanna River. Screening mechanisms for incoming wastewater no longer functioned as designed, allowing debris to accumulate inside the aeration and clarification tank. A short-term bypass system allowed only limited maintenance work to be done. Even if it were retrofitted, the plant would not meet pending state discharge requirements for facilities located within the Chesapeake Bay watershed. Gannett Fleming used Building Information Modeling (BIM) process to design a replacement plant under contract with the Baltimore District of the USACE. The BIM/Revit process made every aspect of the facility's design and construction visible to the entire multidisciplinary team, ensuring that work would proceed as efficiently as possible. To maintain continuous wastewater treatment operations at the installation, which employs approximately 2,000 people, Gannett Fleming developed a carefully phased demolition and construction sequence that featured multiple temporary bypass systems. Green design features were used throughout the facility such as heat pump using treated effluent lowers heating and cooling costs; automatic lighting shutoff system saves electricity, and exterior luminaries minimize light pollution, reduce glare, and use less power. Located near the Susquehanna River the new plant can treat 320,000 gallons of wastewater a day. The new WWTP includes a new influent screening facility, new sequencing batch reactors, a new aerated sludge holding tank, a new ultraviolet system (UV), a new post-aeration tank, new process pumps and blowers, new chemical storage and feed facilities, new influent and effluent samplers, instrumentation and control systems, new electric service, new non-potable plant water pumping system, and a new control building. The existing equalization basin has been reused as a side-line equalization basin, and the existing Parshall flume has been reused. Supporting facilities include electrical service, water and wastewater lines, HVAC and plumbing systems, storm drainage and grading improvements, replacement of asphalt pavement, and relocation of communication lines and information systems. The facility's location presented challenges. The site was only 2 acres, and the project team wanted the new facility to fit the existing footprint as closely as possible. To deal with poor soil conditions, the team employed high-strength, small-diameter micropiles and deep foundations to securely support the new facilities. During excavation, two large underground Imhoff tanks were discovered; because of site constraints and schedule, the team decided to keep them in place. A grade-beam and pile-cap system was used to support the new chemical/blower building above the old tanks. Throughout design and construction, Gannett Fleming focused on improving operational efficiencies while causing as little impact to the surrounding environment as possible. The end result is an efficient, site-sensitive federal facility fully compliant with state pollution-control requirements.

8/31/2018, Room 202, 10:00:00 AM to 10:30:00 AM,

Presenter: Joshua Rodgers, HDR, josh.rodgers@hdrinc.com

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

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

8/31/2018, Room 202, 10:30:00 AM to 11:00:00 AM,

Presenter: Meg Hollowed, Kruger/Veolia, meg.hollowed@veolia.com

Title: Lessons Learned - Operation of Three Full Scale ANITA Mox Sidestream Deammonification Systems

Abstract: Sidestream deammonification has now been implemented successfully around the world. Lessons learned during startup and operation at three full scale US ANITA Mox MBBR sidestream deammonification systems, ranging in size from 670 to 9,010 pounds of ammonia per day (applied load), shall be discussed. Guaranteed performance for all facilities is 75% ammonia removal and 65% total inorganic nitrogen removal within one year of addition of seed media (30-day average). Through a collaborative effort, a large number of lessons learned were compiled and were then divided into two categories: Design and Operational Lessons. Many of the design lessons include provision for ancillary equipment and assurance that this equipment is available prior to startup. While they are not required for successful startup and long-term operation, having these systems available and operational prior to startup would have alleviated some of the extra effort required of the operations staff and reduced the time required for startup. Operational lessons include the importance of daily sampling and/or reliable online data in preventing process upset and the ability of the system to maintain activity even at very low flows for extended periods of time. In addition, if combined with reliable online instrumentation and diligent observation by staff, an aggressive startup may contribute to a shortened startup duration.

8/31/2018, Room 202, 11:00:00 AM to 11:30:00 AM,

Presenter: Vel Subramanian, Atkins, vel.subramanian@atkinsglobal.com

Title: BNR to ENR: Process Modification Achieves ENR Limits and Improves Plant Reliability

Abstract: An existing wastewater treatment plant (WWTP) located at the Chesapeake Bay Watershed in the State of Maryland was designed to treat an average daily flow of 20 million gallons per day (mgd) to meet the biological nutrient removal (BNR) effluent limits. The plant includes four aeration basins that uses the Modified Ludzack-Ettinger (MLE) activated sludge process to achieve lower average total nitrogen (TN) limits. In order to meet the increased average daily influent flows of 26 mgd projected for the year of 2030 and to meet more stringent total nitrogen and total phosphorus effluent limits established by the Maryland Department of the Environment, process alternatives for achieving enhanced nutrient removal (ENR) at the WWTP were to be evaluated. To accomplish this objective, calibrated a process model of the of the existing WWTP using BioWin, an industry accepted biological process simulating software were developed. The calibrated model served as an optimization tool in understanding the current capacity of the BNR treatment process and for predicting the performance of proposed ENR alternatives. Three activated sludge treatment processes were evaluated for the ENR Improvements for the plant expansion: MLE process, 4-stage Bardenpho process and Flexible MLE process. The treatment processes were evaluated and compared for estimated treatment performance, reliability, construction costs, operation and maintenance costs, and the impact of the treatment processes on downstream processes. Based on the recommended alternative, the design and detailed engineering were performed to modify the existing plant process configurations and expansions. The construction of the plant expansion was recently completed and is currently in operation achieving the ENR limits. This study presents the various process alternatives considered for evaluations and why the selected process alternative for the plant expansion to achieve the ENR standards will increase the plant reliability and cost savings.

8/31/2018, Room 203, 9:00:00 AM to 9:30:00 AM,

Presenter: Pranjali Kumar, Carollo Engineers, pkumar@carollo.com

Title: Piloting DPR Without RO at pureALTA - Exploring Sustainable Alternatives for Potable Water Reuse in Central Florida

Abstract: The potable reuse demonstration pilot project at the City of Altamonte Springs, or "pureALTA" is the first project in the State of Florida to explore sustainable production of potable water without the use of costly and energy-intensive processes like reverse osmosis (RO). The need for this project is part of a larger water supply planning effort conducted under the Central Florida Water Initiative which has documented the fact that groundwater alone will not meet future water demands. pureALTA helps define potable reuse as one of potential alternative water supplies required to meet the needs of a growing population. The U.S. has a long history of indirect potable reuse and opportunities in direct potable reuse (DPR) are now being explored. The full advanced treatment (FAT) for potable reuse consisting of membrane filtration (MF), reverse osmosis (RO), and ultraviolet light with advanced oxidation process (UV AOP) has been proven as a sound technology that can be used to achieve high quality purified water for indirect and direct reuse applications. A number of states, including Florida, are taking the next steps in advancing treatment alternatives for potable reuse, and considering alternatives to RO that are more cost and energy efficient. Ozone/biologically active filtration (O3/BAF) presents a promising solution to numerous challenges associated with RO such as disposal of concentrate, relatively high construction cost, and energy intensive operation. pureALTA successfully demonstrated the reliability of O3/BAF when used as part of a robust treatment train in achieving purified water, offering an alternative solution to inland utilities interested in including potable water reuse in their water supply portfolio. pureALTA was operated for a period of 12-months, during which 20 gpm of secondary filtered effluent was treated through O3/BAF, an ultrafiltration (UF) membrane, granular activated carbon (GAC) filtration, and UV AOP. Continuous online monitoring provided real-time operational data on performance. Periodic sampling of regulated and unregulated contaminants, and pathogens provided valuable information on overall removal achieved in the system while allowing for regular assessment of finished water quality. The demonstration pilot utilized some of the latest advancements in process optimization. These included adjusting ozone dose as a function of influent TOC (and nitrite) to achieve ~ 40% TOC removal in the biofilter while minimizing ozone production costs, longer operation of UF without chemical cleans as a result of superior water quality achieved from O3/BAF pre-treatment, and removal of perfluorinated compounds through GAC adsorption. Level V capital and annual O&M cost estimates for a 0.5 mgd facility indicate that O3/BAF based treatment for potable reuse is 1.5 to 2 times less expensive per gallon of new water than RO-based treatment. This project continues to provide high visibility and aid in future rule-making for DPR projects by the Florida Department of Environmental Protection. Accumulated results from this demonstration pilot over the year-long operation will be presented.

8/31/2018, Room 203, 9:30:00 AM to 10:00:00 AM,

Presenter: Andrew Hood, Keystone Engineering Group, dhood@kegi.net

Title: Naval Support Activity Annapolis (NSAA) – Water Reduction and Conservation

Abstract: The Naval Facilities Engineering Command (NAVFAC) recently completed a project at the Naval Support Activity Annapolis (NSAA) to improve water conservation and save on operating costs. In order to reduce process wastes from the NSAA facility, NAVFAC initiated an investigation for recycling and minimizing these wastes from the water treatment facility. The investigation focused on the amount of waste generated from the continuous backwashed sand filters and the clarifier blowdown. Based on the evaluation, various improvements were identified to be upgrading including: New water treatment residuals dewatering facility consisting of two centrifuges, a polymer feed system, and truck loading bay. Retrofit of the existing waste holding tank to serve as a gravity thickener and the addition of a new gravity thickener. Addition of a reject pump station collecting spent wash water from backwashing of the existing sand filters. A recycle water treatment system consisting of a lamella gravity settler. Through initiation of the improvements, the NSAA anticipates saving approximately 380,000-gallons of water a day. Considering the plant produces an average of 1-million gallons per day, this results in a 38% reduction in water conservation. The presentation will focus on the modifications made to the facility to accomplish this significant savings.

8/31/2018, Room 203, 10:00:00 AM to 10:30:00 AM,

Presenter: Dave MacNevin, Tetra Tech, dave.macnevin@tetratech.com

Title: Potable Reuse Treatment Trains: Challenges and Innovations at Full-Scale

Abstract: As more and more utilities test and implement potable reuse strategies, a growing body of knowledge is being developed to guide the successful implementation of potable reuse projects. Not every potable reuse treatment train is the same, since each utility's program must satisfy site-specific constraints and challenges As a part of its initial efforts to develop an Advanced Water Treatment Demonstration Program, Hillsborough County Public Utilities conducted a broad review of potable reuse treatment trains, including an in-depth literature review of full-scale potable reuse facilities in the United States. The review focused on understanding the following key aspects of each program's treatment process: program drivers, treatment process selection factors, operational challenges encountered, and process innovations. This presentation/paper provides a summary of more than 35 operational challenges and more than 60 process innovations encompassing the following categories: Source control, wastewater treatment processes, reclaimed source water, microbiology, membrane filtration (MF/UF), reverse osmosis, UV/advanced oxidation, granular activated carbon/biological activated carbon, post-treatment, disinfection byproducts, injection wells and aquifers, spreading basins, watershed management, direct potable reuse, alternative energy, natural treatment systems, and cost control. The presentation/paper also includes a color-coded table summarizing more than 50 potable reuse treatment trains that are either in operation, under construction, or have been tested. The treatment discussion focuses on the historical trends in the development of treatment trains (replacement of lime clarification with microfiltration, substitution of biologically activated carbon for granular activated carbon), while also exploring variations to conventional approaches for RO-based treatment (ozone/pasteurization pretreatment of MF/UF, UV disinfection vs advanced oxidation, GAC treatment of purified water, post-treatment stabilization) and carbon-based treatment (ozone pre/post BAC dosage; variations in use of UF, GAC, alum, or UV). This compilation of experience, challenges, innovations, and treatment approaches with potable reuse provides a convenient reference to support the expansion and implementation of potable reuse. Continued innovation and collaboration in potable reuse will help water utilities move confidently together into a future of sustainable, abundant water supplies.

8/31/2018, Room 203, 10:30:00 AM to 11:00:00 AM,

Presenter: David Meredith, AECOM, david.meredith@dcwater.com

Title: Holistic Approach to Process Service Water (PSW) System Evaluation for DC Water Blue Plains Advanced Wastewater Treatment Plant (AWTP)

Abstract: The DC Water Blue Plains AWTP, with a capacity of 384 MGD, provides wastewater treatment to more than two million Washington metro area customers. The PSW system at Blue Plains pumps and distributes treated plant effluent through a complex piping network for various applications – pump seal water, flushing water for solids handling piping, general housekeeping washdown water, and process dilution water. Due to infrastructure performance concerns after recent pump and pipe failures and plant upgrades, studies were commissioned to evaluate the existing PSW pumping and distribution system. The system was investigated utilizing a combination of records/drawings review, a corrosion assessment report, a field walk of the distribution system, and discussion with facility staff. Data collected was compiled and processed to perform a physical hydraulic model of the pump system and a criticality matrix analysis of each section of pipe. A pump evaluation, based on current and future demands and pump conditions, resulted recommendations for pump replacement to increase capacity and efficiency. A pipe criticality matrix analysis, an industry-standard practice in the field of asset management, was completed utilizing a dual-axis matrix approach whereby the Consequence of Failure (CoF) was charted on one axis, versus the Likelihood of Failure (LoF) on the opposing axis. The primary goal of the criticality matrix approach is to minimize risk to the utility owner, given the available funds the owner has to manage the particular asset. Based upon the complexity of the system and known information available, a three-point LoF and CoF system was used. The banding utilized is as follows: LoF = 3: Pipe Age = 26-45 Years; LoF = 2: Pipe Age = 6-25 Years ; LoF = 1: Pipe Age = 1-5 Years; CoF = 3: Coding Category Applicable to Large Diameter Main Loop Pipes and Pipes Serving More Than One Critical Demand at the Plant · CoF = 2: Coding Category Applicable to Pipes Serving One Critical Demand at the Plant ; CoF = 1: Coding Category Applicable to Pipes Serving Non-Critical Demands at the Plant . The Lof bands provided a sufficient degree of accuracy while unnecessarily complicating the evaluation process and subsequent analysis. The CoF bands provided sufficient degree of correlation to the importance of the various sections of pipe and took into account alternate flow paths available as well as other available water sources when a section of pipe is being replaced. Once relevant LoF and CoF factors had been identified and assigned to each section of pipe, this information was translated into criteria that the owner could institute in the form of definable actionable time horizons: Green Action Horizon - Perform Re-Evaluation of Infrastructure in 10 Years; Yellow Action Horizon - Perform Re-Evaluation of Infrastructure in 5 Years; Red Action Horizon - Immediate Repair Recommended. As a result of the pumps physical modeling and criticality matrix analysis, capital improvements consisting of PSW pump and piping replacements were prioritized, funded and scheduled in a synergistic fashion.

8/31/2018, Room 203, 11:00:00 AM to 11:30:00 AM,
Presenter: Lynne Moss, Black & Veatch, mosslh@bv.com
Title: Biofilters for Odor Control: Beyond the Basics
Abstract: Biofiltration is an odor control technology that is familiar to many utilities and consultants, and is represented primarily by organic biofilters and engineered mineral-based media systems. Several alternative biofilter technologies are less frequently used but offer distinct advantages in some applications, however. These biofilters include open bed systems employing lava rock media and enclosed shell media systems. Both technologies offer the simplicity and, in some cases, the low capital cost associated with organic media biofilters but, with their long media life, can offer lower lifecycle costs than organic systems. This presentation will focus on both lava rock and shell media systems. Specifically, the presentation will discuss the development and performance of each type of system, identifying critical success factors for system design. The presentation will be based upon recent Black & Veatch projects, including: a 45,000 cfm lava rock biofilter in Ohio; a full-scale shell biofilter pilot in Florida (that evaluated performance with respect to hydrogen sulfide and other reduced sulfur compounds, volatile organic compounds, and odor removal); and a 6,000 cfm shell media biofilter in North Carolina. The presentation will also discuss operational characteristics and limitations of these two systems.

8/31/2018, Room 204, 9:00:00 AM to 9:30:00 AM,
Presenter: Christopher Overcash, KCI Technologies, Inc., covercash@kci.com
Title: Alignment Studies for Large Diameter Water Mains: The 450A High Zone 48-inch Water Main Alignment, Capacity and Phasing Plan
Abstract: KCI Technologies, Inc. (KCI) was retained by the Washington Suburban Sanitary Commission (WSSC) to perform a capacity and alignment study to select a new redundant transmission main for the Prince George's County High Pressure Zone HG450A, and prepare the 30% Design Plans. The project was initiated because portions of the existing PCCP transmission main (42-inch through 54-inch diameter) that currently serves the 450A and 290B Pressure Zones is scheduled to be out of service almost every year starting in approximately 2022 to meet the requirements of WSSC's PCCP Inspection Program. This new transmission main is required to continue to maintain adequate service (domestic and fire protection) to WSSC's customers while the existing transmission main is out of service. The new transmission main must satisfy WSSC's hydraulic capacity requirements for the 450A and 290B service areas and provide redundant service should the existing main outright fail. KCI developed comprehensive screening criteria to evaluate ten (10) alignment alternatives which met the capacity prerequisite established by WSSC. These criteria took into account important design factors including -hydraulic considerations, environmental impacts, constructability, permitting requirements, easements, operation and maintenance considerations and construction cost. A "10-Alignment" report evaluated, rated and ranked the ten (10) alternative water main alignments based on the pre-screening criteria derived from the full array of screen criteria noted above. Subsequently the ten (10) alternative alignments were evaluated by WSSC using their "all-pipes" hydraulic model for the future 2030 Maximum Day demand scenario assuming the existing 54"/42" PCCP main in question was out of service. Following WSSC's review of the initial 10 alignments, KCI prepared a more polished "5-Alignment" report which sieved out the top five (5) ranked alignments identified in the 10-Alignment report based on the full set of screening criteria. KCI presented the findings of the report to the Commission and wide range of external stakeholders. Valuable inputs from the stakeholders were evaluated and incorporated into the alignment study. As a follow-up to the stakeholder workshop, an internal meeting was held to select the top two (2) alternative alignments. WSSC agreed with KCI's recommendation of selecting Alignments B & E for further evaluation. Taking into consideration the future interconnections planned for the alignment study area, KCI performed a more in-depth assessment and ranking of the Alignments B and E in order to determine the final preferred water main alignment to advance to 30% Design. The final evaluation criteria included hydraulic characteristics and benefits, conceptual construction cost opinions, constructability issues, easement acquisitions, environmental and cultural impacts, social and community impacts, traffic impacts, permitting requirements, and operation and maintenance issues. The chosen alignment encompassed approximately 3.9 miles of new 48-inch transmission main with crucial tie-ins to existing 54" main on the north, planned 42" main on the south and the Andrews Elevated Tank near Joint Base Andrews. In addition to the 30% design plans, KCI developed a Strategic Project Management Plan to aid WSSC in budgeting and planning for this critical CIP project.

8/31/2018, Room 204, 9:30:00 AM to 10:00:00 AM,
Presenter: Scott Shipe, Retired Water & Wastewater Professional, jssh2o@aol.com
Title: The Historical Analysis of the Potomac River Chesapeake and Ohio Canal
Abstract: The Chesapeake and Ohio Canal, abbreviated as the C&O Canal and occasionally called the "Grand Old Ditch," operated from 1831 until 1924 along the Potomac River from Washington, D.C., to Cumberland, Maryland. The canal's principal cargo was coal from the Allegheny Mountains. Construction on the 184.5-mile (296.9 km) canal began in 1828 and ended in 1850 with the completion of a 50-mile stretch to Cumberland. Rising and falling over an elevation change of 605 feet (184 meters), it required the construction of 74 canal locks, 11 aqueducts to cross major streams, more than 240 culverts to cross smaller streams, and the 3,118 ft (950 m) Paw Paw Tunnel. We also will learn about the Seven Potomac River Dams that were constructed to provide water for the canal and other rare facts.

8/31/2018, Room 204, 10:00:00 AM to 10:30:00 AM,
Presenter: Michael Skerritt, Mott MacDonald, michael.skerritt@mottmac.com
Title: DC Water Completes 5,000 AMR Replacement per Month - Here Is How They Did It!
Abstract: DC Water commenced an ambitious program to replace approximately 90,000 water meters and/or meter transmitting units (MTUs) over an 18 month period. DC Water recognized that this $31 million program is critical from both a financial viability and customer confidence perspective and implemented the management framework and program team accordingly. Field work commenced in February 2017 with an anticipated completion date in mid-2018. As of December 2017, over 56,000 replacements were successfully completed and the program is ahead of schedule and under budget. This presentation includes a review of the planning, ramp-up and full production of this program and lessons learned. Two unique aspects of this program are the daily automated data transfer between DC Water and the installation contractor, and that DC Water supplies the equipment and materials to the installation contractor who is expected to install a minimum of 5,000 meters per month (250/day). To manage this, a framework and program team were developed to allow for expedited decision making. The program was chartered and DC Water project team assembly included CIS/Billing, Customer Service Support, Inventory Management, IT, Public Outreach, Procurement and other key business units to ensure program success. To oversee the project teams, Mott MacDonald was retained as the Program Management Office and was charged to develop / oversee the program to ensure schedule and budget compliance within the project goals. Mott MacDonald provided planning, procurement support, resource and cost loaded scheduling, contractor oversight, project controls, coordination with several supply vendors and a separate installation vendor. These efforts help to promote a program that minimized service interruptions and maintained close coordination with billing, risk management, and DC Water's executive staff with monthly status reports to the General Manager.

8/31/2018, Room 204, 10:30:00 AM to 11:00:00 AM,
Presenter: Devang Prajapati, Mott MacDonald, devangprajapati1979@gmail.com
Title: When an Air Gap Creates a Major Project … DC Water's Experience with Cross Connection Preventation At Its Storage Facilities
Abstract: The 2008 Sanitary Survey of DC Water's distribution system conducted by EPA Region III noted significant deficiencies at all five of DC Water's buried concrete storage facilities. The deficiencies included cross-connection on drain pipes of the storage facilities, inadequate ventilation, and potential leaks through the buried concrete roofs of the reservoirs. The possibility of cross-connection due to absence of an air gap on drain pipes was first identified in the 2002 Sanitary Survey, was re-evaluated in the 2005 Sanitary Survey, and was noted as a significant deficiency in the 2008 Sanitary Survey. Implementing a textbook solution to provide air gap on the drain pipes of these facilities had physical limitations. DC Water and EPA agreed to establish an expert panel to review the requirements of air gap and arrive at an alternative solution. Based on the 2009 expert panel findings, DC Water performed a feasibility study to eliminate cross connections for each of its facilities which was approved in 2010. DC Water established a multiyear rehabilitation and upgrade program for all its storage facilities to address the three significant deficiencies at five of the facilities, and committed to a timeline for completing these to the EPA. The program also included structural repairs, remote water quality monitoring, electrical, mixing, and SCADA upgrades for five facilities in the system. DC Water successfully met the December 2015 deadline for completion of four of its storage facilities, and is scheduled to meet the December 2021 deadline for the fifth storage facility, Soldiers Home Reservoir. This paper discusses the overall upgrade program and its elements using the 15 MG buried concrete Soldiers Home Reservoir upgrade. The current design process will be used as a case study to highlight the key challenges during planning, design, and construction of these projects to meet the EPA deadline.

8/31/2018, Room 204, 11:00:00 AM to 11:30:00 AM,
Presenter: John Deignan, DC Water, john.deignan@dcwater.com
Title: Protect Your Pipes from Clogging Criminals!
Abstract: Wastewater infrastructure throughout the country is plagued by pump system clogs and "fatbergs" due to the improper disposal of materials like wipes and fats down toilets and drains. Public messaging is critical to addressing this issue to prevent costly repairs and to protect our waterways. The Metropolitan Washington Council of Government's (COG's) Protect Your Pipes (PYP) campaign is an engaging outreach campaign advocating for the protection of wastewater infrastructure and source water health through public education. The campaign has a "crime stopper" theme targeting three "criminals" or "usual suspects" which should be kept out of toilets and drains: 1) Fats, Oils, Grease, 2) Medications, and 3) Non-flushable wipes and other items. The PYP campaign—designed and promoted by sixteen utility and jurisdictional members from Maryland, Virginia and the District of Columbia—unites these three clogging "criminals" under a unified brand consisting of a logo, characters, and a comprehensive website (www.protectyourpipes.org), coupled with an engaging social media presence, campaign ads and public engagement at regional events. The PYP website has reached over 100,000 people in metropolitan Washington since its launch in 2015, and PYP's combined Facebook and Twitter efforts have reached well over 40,000 people. The PYP campaign has developed coloring sheets, word searches, and stickers featuring the Grease, Wipes, and Medications characters for use in elementary school programs, and wipes canisters and pill boxes for public outreach events. The characters are colorful, cute, and relatable.
New to this year's PYP presentation: We have developed animated 15-second and 30-second ads for use in movie theaters and on social media. We'll show these ads to session participants. The PYP brand and materials are licensed and available for adoption by other utilities and organizations.

8/31/2018, Room 205, 9:00:00 AM to 9:30:00 AM,

Presenter: Matthew Williams, WesTech, mwilliams@westech-inc.com

Title: Improving Nitrate Removal With Innovative Biocatalyst

Abstract: Elevated and increasing nitrate levels in groundwater are of significant concern to water utilities across the US that depend on groundwater sources. Delaware and Maryland rank high on the list of states with this issue. Physical and chemical methods, such as ion exchange and reverse osmosis, can reduce nitrate levels in the treated water but these technologies are expensive to operate and require disposal of a concentrated waste stream. Conventional biological systems remove nitrate by converting it to nitrogen gas, however conventional biological systems have long start-up times, are susceptible to process upsets and produce sludge streams that require management. The presentation discusses an innovative biological treatment system that was implemented at Sunny Slope Water Company resulted in the Division of Drinking Water (DDW) granting Conditional Acceptance of the technology. Sunny Slope Water Company (SSWC) has implemented an innovative biological treatment system for removal of nitrate developed by Microvi Biotechnologies. The nitrate removal system uses a single species of a specifically selected, naturally occurring organism to convert nitrate to nitrogen gas. The organisms are irreversibly retained in polymeric composite structures, referred to as biocatalysts, which are designed to create an ideal microenvironment for the organism. This creates a high density of very efficient denitrifying organisms within the reactor, resulting in fast start-up time, high rates of reaction and a process resilient to conditions that would upset conventional biological processes. Furthermore, the organisms are in a metabolically active, non-growing state, which means they produce no excess biomass and hence there is no waste biological sludge stream to be managed. A demonstration trial was performed at the SSWC site. Results from the demonstration trial showed that the nitrate removal system was able to consistently and reliably reduce nitrate from 25 mg/L (6 mg/l as N), and up to 50 mg/L (11 mg/L as N), to less than 5 mg/L (1 mg/l as N). The trial also demonstrated the robustness of the process as the system recovered rapidly from challenge tests where feed flow or chemical feed were interrupted. The trial further demonstrated key benefits of the process, these being fast start-up time, process stability and that the system does not produce a biomass as in conventional biological system meaning that there is no sludge stream requiring management. The results of the demonstration trial resulted in California Department of Health (now Division of Drinking Water (DDW)) granting Conditional Acceptance of the technology. Conditional Acceptance allowed the design and construction of a full-scale nitrate removal system for SSWC. The 300 gpm full scale system has shown similar performance to the demonstration trial, with nitrate removal from about 40 mg/L (9 mg/L as N) to 5 mg/L (1 mg/l as N). A permit from DDW was granted by May 2017. With this permit in place the nitrate removal system is allowed to introduce treated water into SSWC's system as part of the drinking water supply to its customers, allowing SSWC to deliver water meeting drinking water standards at significantly reduced cost.

8/31/2018, Room 205, 9:30:00 AM to 10:00:00 AM,

Presenter: Lori Kappen, Gannett Fleming, Inc., lkappen@gfnet.com

Title: Air Scour Demonstrates Filter Performance and Economic Benefits in Philadelphia

Abstract: The Philadelphia Water Department (PWD) provides drinking water, wastewater, and stormwater utility services to the City of Philadelphia and portions of Bucks County, Pennsylvania, with a high degree of reliability, consistent regulatory compliance, and environmental stewardship while demonstrating fiscal responsibility to their customers. PWD recently completed a 1.5-year full-scale demonstration test to assess advancing filter backwash performance by characterizing and quantifying potential improvements to the overall efficiency of the filtration system. During the full-scale study, PWD's Queen Lane Water Treatment Plant (QLWTP) installed AriesTM air scour equipment in 2 experimental filters and performed comprehensive field optimization and data collection to evaluate the technical and economic benefits of air scour enhanced filter backwashes. The performance of air scour experimental filters was compared to the performance of the 38 remaining baseline control filters equipped with surface wash equipment at QLWTP. The QLWTP is a Partnership for Safe Water participant and has produced high-quality water with filter effluent turbidity consistently less than 0.1 NTU. Although limited opportunity exists to further lower filter effluent turbidity, the demonstration study evaluated the potential of the air scour backwash system to: augment filter media cleaning, reduce backwash water usage, reduce process wastewater production, extend filter run times, reduce power usage, and enhance operations and stormwater relief while meeting the desired filter effluent quality. The analysis of filter performance among all 40 filters considered factors, such as the quantity of backwash water consumed, energy usage, peak backwash water flow rates, total backwash cycle duration, filter ripening peak turbidity and duration, filter run times, rate of headloss accumulation, and filter cleaning effectiveness/mudball formation. Production parameters evaluated include filter run time, filter headloss, total throughput, filter run volume, and surface wash and backwash volumes. The difference in operating costs for the air scour versus surface wash system was estimated based upon calculations for each system to determine the economic return on capital investment for an air scour equipment installation. The presentation will incorporate test results into complete techno-economic feasibility analyses of net unit filter run volume, energy usage, operation and maintenance details, and estimates of systematic life cycle cost and benefits. Results will identify the differences of filter performance between air scour system and surface wash equipped filters with technical pros-and-cons. The outcome of this unique full-scale test will support decision-making for the facility during the capital planning process to identify the optimum filter backwash system along with its potential budgetary requirements and long-term operating cost savings.

8/31/2018, Room 205, 10:00:00 AM to 10:30:00 AM,
Presenter: Joe Nattress, CH2M/Jacobs, joe.nattress@ch2m.com
Title: High Rate Clarification – Innovation Applied to Treat WTP Liquid Residuals
Abstract: Washington Suburban Sanitary Commission (WSSC) operates the 283 MGD Potomac WFP in Maryland. Included in the plant are solids handling systems, including thickening and dewatering. As a part of a recent assessment of residuals system capacity at the WFP, it was identified that the existing sanitary sewer capacity may be a limiting factor for future solids processing. The current sanitary sewer accommodates both gravity thickener overflow and filtrate from belt filter presses. To alleviate concerns over sanitary sewer capacity, it was determined that treating the belt filter press filtrate and discharging the treated water to the river would be a viable solution. Pilot testing was performed with two proprietary high-rate clarification systems – Actiflo® and Co-Mag® to determine treatment effectiveness to meet NPDES discharge limits. This is the first known application of these technologies to the treatment of dewatering process filtrate. This presentation will discuss the goals of the pilot testing, adjusting pilot performance to meet non-drinking water quality requirements, and the results from pilot testing. Positive results from pilot testing both technologies demonstrated the ability to meet NPDES limits and pilot testing goals successfully, and have allowed the project to proceed into design.

8/31/2018, Room 205, 10:30:00 AM to 11:00:00 AM,
Presenter: Francis Kungu, Engineering Design Technologies, Inc., Francis.Kungu@edtinc.net
Title: Year-Long Evaluation on the Occurrence and Fate of Pharmaceuticals, Personal Care Products, and Endocrine Disrupting Chemicals in an Urban Drinking Water Treatment Plant
Abstract: The occurrence and removal of thirty representative pharmaceutical and personal care products (PPCPs) and endocrine disrupting chemicals (EDCs) in an urban drinking water treatment plant (DWTP) were investigated for a period of one year to evaluate current system's treatment efficacy and assess occurrence of PPCPs and EDCs in finished drinking water. Results showed that the average total PPCPs and EDCs concentration in the surface water source was around 360 ng/L (median concentration = 340 ng/L) with 57% coefficient of variation (CV). The median concentrations of most of the individual PPCPs and EDCs in the surface water were below 15 ng/L except for N,N-diethyltoluamide (DEET) and nonylphenol, which were at 122 and 83 ng/L, respectively. The compounds DEET, nonylphenol, ibuprofen, triclosan, atrazine, tris(2-chloroethyl)-phosphate (TCEP), bisphenol-A, and caffeine (in the order of decreasing median concentration) were among twenty compounds detected at least once in the surface water, while all of the above detected compounds, except two, were also detected in the finished drinking water. The average total PPCPs and EDCs concentration in the finished drinking water was around 98 ng/L (median concentration = 96 ng/L) with 66% CV. The median concentrations of most detected PPCPs and EDCs in drinking water were below 5 ng/L except for DEET and nonylphenol, which were at 12 and 20 ng/L, respectively. There was a strong correlation (r = 0.97) between PPCPs and EDCs' concentrations in the source water and in the drinking water over the one-year study period when data points from two sampling events with unusual removals were excluded. Individual water treatment unit processes showed greater temporal variations of PPCPs and EDCs removal efficiencies than the overall treatment processes. The removal efficiencies also varied greatly among different PPCPs and EDCs. The average removal for total PPCPs and EDCs was 76 ± 18% at the DWTP, with ozonation showing the highest removal efficiency. Based on the similar occurrence and removal trends observed as that of total PPCPs and EDCs in this study, DEET and nonylphenol can be considered as potential indicator compounds for predicting the occurrence and removal of total PPCPs and EDCs in surface water. No strong correlations could be found between total PPCPs and EDCs removal and the removal of suspended solids, turbidity, or organic carbon. Keywords: PPCPs; EDCs; DEET; nonylphenol; drinking water treatment; ozonation; indicator compounds

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8/31/2018, Room 205, 11:00:00 AM to 11:30:00 AM,
Presenter: Kelsey Kenel, HDR, kelsey.kenel@hdrinc.com
Title: Evaluating the Presence, Impacts and Treatment of Urea in Surface and Potable Water
Abstract: Urea is a non-volatile compound that is naturally formed in the liver from ammonia produced by the deamination of amino acids. Although there is limited information studying the urea presence in drinking water, urea is often found in surface water sources. It is highly soluble and can enter the environment, through various pathways including excretion from mammals, fertilizer runoff, dialysis waste, and waste from urea manufacturing. The months of higher fertilizer applications and rainfall have been linked to increases in urea concentrations in surface water and the growth of harmful algal blooms in the Chesapeake Bay. Currently there are no enforceable federal drinking water limits for urea. The US EPA has determined that there is an inadequate amount of information to assess the carcinogenic potential of urea and associated health risks. Concerns associated with the presence of urea in potable water stem primarily from industrial users, such as semiconductor manufacturers that have recorded manufacturing process disruption from urea concentrations as low as 1 to 5 ppb. While drinking water treatment utilities may receive water from reservoirs and surface waters that contain urea as high as 75 ppb, few track the presence and abundance of urea. Several point-of-use urea treatment methods are available for urea mitigation in potable water: biological treatment with biological reactors or biofilters, adsorption with GAC filtration, advanced oxidation processes including UV/H2O2 or UV/O3, direct contact membrane distillation and reverse osmosis. Apart from reverse osmosis, each method has been shown to have urea removal of up to 94% or higher. Water treatment plants can also mitigate urea in plant influent through advanced combinations of physical, chemical and biological treatment methods. This presentation will provide additional information on urea characterization, presence in potable water, and a treatment method evaluation removing urea from potable drinking water.

8/31/2018, Room 206, 9:00:00 AM to 10:00:00 AM,
Presenter: Christopher Pomeroy, AquaLaw PLC, chris@AquaLaw.com
Title: Engineering Ethics for Professional Engineers
Abstract: This abstract will focus on engineering ethics for professional engineers.

8/31/2018, Room 206, 10:00:00 AM to 10:30:00 AM,
Presenter: Alex Palmatier, HDR, alex.palmatier@hdrinc.com
Title: Statistically Significant Sample Set (Easy for You to Say) - A streamlined approach to Condition Asset Assessment for the City/County Utilities Commission
Abstract: Water, wastewater, and stormwater utilities face ever increasing resource limitations, aging infrastructure, growth pressures, regulatory changes, and limited budgets. Coupling these drivers with stakeholder expectations and increasing level of service requirements identifying the right assets to replace and which to maintain becomes an increasing important component of every utilities long range planning. Most agencies condition driven CIP programs are reactive in nature. Staff has an understanding of where issues are in the system, investigations are performed, and remediation is completed. Analysis of this data would lead most to believe that the entire system is in disrepair as the data being collected is the worst in the system. Having an understanding of the condition of the entire sewer collection system, and utilizing data to drive decisions is necessary in order to develop both near term investigation processes and CIP projects as well as a comprehensive long range CIP. The City/County Utility (CCU) manages more the 1,700 miles of wastewater collection system. In order to more accurately forecast gravity sewer system condition and renewal needs over time, the CCU undertook a near-term condition assessment program, a Statistically Significant Sample Set (4S) of pipes. The program was developed to estimate the condition of CCU's sanitary sewer system by evaluating the physical condition of a statistical sample of the entire pipeline system which would then be used as a representation of the system as a whole. This is much like opinion polling used to pick a representative statistical sample and project those polling results over an entire population. The target for the statistically significant sample is to provide results or projections with plus or minus 25% accuracy and 85% level of confidence. The methodology for planning and implementing the near-term program included the definition of asset classes based on the attributes of gravity pipes (age, material, etc), assessing the sanitary sewer overflow (SSO) risk from structural condition issues for the asset classes, calculation of the appropriate sample size for the 4S, selection of a basin for SSES, and selection of technologies for inspection. The statistical sampling inspection program produced a significant amount of information regarding the structural condition of the gravity sewer system. This information was then used forecast areas for further investigation and inform strategies for future SSES efforts.

8/31/2018, Room 206, 10:30:00 AM to 11:00:00 AM,
Presenter: Mike Hanna, Black & Veatch, HannaKM@bv.com
Title: Getting More for Less: The Benefits of Value Engineering
Abstract: Utilities face many competing demands, as aging infrastructure and shifting populations impact their project prioritization, design, and execution. Increasing financial and operational pressures combined with tightening budgets mean that utilities have had to become adept at doing more with less. A detailed, value engineering approach to design and construction can help utilities provide needed improvements while controlling both capital and operational costs. A value engineering review of an $8 million sewage pumping station rehabilitation design uncovered multiple opportunities for savings. Changes were recommended to the proposed pumping system, piping configuration, and electrical, structural, and HVAC plan in order to streamline capital and construction costs. Implementation of a number of these recommendations, including installing new electrical gear within the existing station, avoiding new building construction, yielded approximately $1 million in construction savings. Another recent wastewater facility rehabilitation included replacement of dewatering equipment, building rehabilitation, and complete replacement of the electrical gear and distribution system, all while maintaining plant operation. A value engineering approach was developed to build a new electrical room and install the new gear in parallel with the old, while replacing the corroded conduit system with a cable tray system. This approach sliced six months from the construction schedule and saved significant capital expense while providing a system that is easier to maintain and modify in the future. This presentation will explain how to use a value engineering approach to identify capital, construction, and operational savings. It will explore and assess multiple examples of value engineering and will demonstrate that understanding the big picture, attention to even the small details, and precision in communication can provide capital savings in the moment and continued operational savings for the long term, allowing utilities to continue to accomplish more with less.

8/31/2018, Room 206, 11:00:00 AM to 11:30:00 AM,

Presenter: John Kingham, Bently Nevada, Inc., john.kingham@bhge.com

Title: Condition Monitoring of Plant Equipment

Abstract: Why do we pay attention to vibration? Because it is the earliest indicator of impending failure. This will be shown in the P-F curve Once the P-F curve is understood, and vibration is shown to be the first indicator, it is important to determine which assets are important enough to monitor. This is done by looking at an assets criticality as determined by production loss, Safety concerns, Environmental concerns, impact on product quality. Some assets will be deemed unimportant, and a sound maintenance strategy for these would be run to failure. Other maintenance strategies are time based, and condition based. We would show that 89% of failures are not time based, and that condition based strategies are preferable. Further to our discussion on criticality is the question of whether periodic or continuous monitoring is needed including the ability to automatically shutdown a machine.