2017 Tri-Association Conference

Technical Program Summary

August 29 – September 1, 2017 Ocean City, Maryland
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Room 201 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Steve Sebastian, Envirosight
Presenter Email: SSebastian@envirosight.com
Title: "Phased Assessment Strategy for Sewers (PASS): Understanding Sewer Condition Quicker with Fewer Resources."
Abstract: As a municipality are you faced with deteriorating infrastructures and dwindling budgets? If so, maybe it is time to reevaluate your pipeline inspection program. The evolving challenges of sewer inspection require adapting new technologies and methodologies to gain new efficiencies and better data. CCTV-only inspection approach is often too cumbersome to yield timely, actionable, system-wide data. A new approach is needed-one that maintains the goal of comprehensive assessment, but which increases productivity and reduces costs. While CCTV inspection is an essential tool in any condition assessment program, many times we find ourselves inspecting lines that don't need the level of scrutiny a crawler offers. Rapid assessment tools like zoom cameras and video nozzles are ideal front-line tools for identifying such lines. If municipalities incorporate these tools into a three-stage approach to inspection, they can save significant time and money. This talk aims to introduce the PASS (Phased Assessment Strategy for Sewers) to people managing and conducting sewer inspections. PASS is a plan for understanding sewer system conditions quicker with fewer resources. The presentation quantifies the specific time and cost savings that can be attained through implementing this unique workflow strategy. Adapting PASS can allow for inspectors to prioritize system-wide which lines need the most attention, as well as have time to inspect more regularly.

Room 201 August 30th, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Gian Cossa, DC Water
Presenter Email: gian.cossa@dcwater.com
Title: Change Management Essentials
Abstract: There are several ways to implement change management and the best methodologies all share the basic concept of offering a highly defined, step by step process for folks to follow. Change management is referred to as one of the soft skills of managing a project, but very often it is these precise activities that drive success of the project to a great degree. Today's presentation will explore the elements of an effective change management approach utilized by DC Water in advancing their mission goals. The Change Management Program that DC Water utilizes is based upon the Prosci ADKAR Model, which is recognized as a leading change management model that has been widely adopted throughout the world. The Prosci ADKAR Model starts with an understanding of the 3 foundational elements of Leadership, Project Management, and Change Management. This framework along with corresponding assessment tools provide the basis for ensuring that your projects are positioned for success. Once a project has been technically scoped out, it is important to recognize the people side of change management which can be categorized into 1 of 3 phases: Preparing for Change, Managing Change, and Reinforcing Change. Preparing for Change requires that one step back and evaluate the change, the organization, your team and the strength of your sponsorship. This involves understanding the unique risks based upon the characteristics of the change and the attributes of the impacted organization. Managing Change requires crafting and adopting 5 core plans related to Communications, Sponsor Roadmap, Training, Coaching, and lastly Resistance Management. At this phase, change management is integrated into the project plan and becomes a formal part of the project. Reinforcing Change is all about making sure that the change is actually taking hold and can withstand the test of time. This involves compliance audits, performance measurement and resistance management along with recognition, awards, and celebrations which can help sustain the change.

Room 201 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Gage Muckleroy, GHD Inc.
Presenter Email: gage.muckleroy@ghd.com
Title: Vallejo Sanitation and Flood Control District Journey in Asset Management - This AMP goes to 11!
Abstract: The ultimate goal of developing and implementing the Vallejo Sanitation and Flood Control District (VSFCD or the District) Asset Management (AM) Program is to optimize the infrastructure life cycle and continuously deliver the required levels of service to customers while balancing the cost of service and risk of asset failure. Phase 1 of the work, which is now complete, has focused on developing an AM framework and implementation plan, and pilot AM plan around the solids processing facility at the wastewater treatment plant. During Phase 1, 50-year investment projections were developed for capital, operations, and maintenance activities at the asset level - at different levels of sophistication based on asset criticality to the District. Phase 2, currently in progress, uses the framework and experience from the pilot AM plan and expands the efforts to the other processes, above and beyond the solids processing facility assets, covering up to 2,500 assets. The approach is based on EPA's Sustainable Asset Management Framework and is focused on implementing a sustainable strategy within the District. This presentation will discuss the results of Phase 1, and the progress to date of Phase 2, including: Development of an AM strategy and implementation plan for the solids processing facility; asset inventory and register development for the solids processing facility (~900 assets); how VSFCD is using condition assessment protocols to estimate remaining asset life; how risk is being used to prioritize needs and how tolerable risk is considered in the renewal decision making; how "what-if" scenarios are modelled for different capital, operational and maintenance strategies; content and structure of the Pilot AM Plan; needs and associated future investment requirements identified using Decision Support System (DSS) software; lessons learned and next steps; initial steps towards building an AM plan for the whole wastewater treatment plant; and, addition of over approximately 2,500 assets to the inventory to cover the rest of the treatment plant (above and beyond the solids processing facility assets that were evaluated during Phase 1) and progress to date.

Room 201 August 30th, 2017 1:30:00 PM to 2:00:00 PM

Presenter: Charlie Card, EBA Engineering, Inc.

Presenter Email: charlie.card@ebaengineering.com

Title: Lose the Spreadsheet! Asset Management Database Design and Integration

Abstract: The Lancaster Area Sewer Authority (LASA) currently utilizes an Excel spreadsheet tool as their asset management Decision Support System. The spreadsheet tool was developed for the Environmental Protection Agency (EPA) and the Water Environment Research Foundation (WERF) for inclusion in the Sustainable Infrastructure Management Program Learning Environment (SIMPLE). The tool is available to subscribers and is considered open source. The Excel spreadsheet was populated with a registry of LASA's vertical and horizontal wastewater system assets, including condition ratings and other asset attributes. The spreadsheet calculates business risk exposure (BRE) scores, asset residual life, and rehabilitation and replacement costs. It also generates and graphically depicts a 100 year investment profile (Nessie Curve). While the tool initially supported LASA's asset management objectives, several drawbacks must be addressed. Since 35,000 vertical and horizontal LASA assets must be accommodated in the registry, the spreadsheet has become too large for practical use. Opening the spreadsheet to update the asset registry or perform calculations frequently requires up to 30 minutes. Through the work order management process, vertical and horizontal asset data are constantly being updated in LASA's Computerized Maintenance Management System (CMMS) and GIS maps. The same data must then be manually and redundantly updated in the Excel spreadsheet to synchronize the asset management registry with system changes. This redundant data entry is both inefficient and prone to errors. For these reasons, LASA desired to replace the Excel spreadsheet tool with integrated Relational Database Management System (RDBMS) technology. LASA seeks to preserve the same registry, condition assessment rating scales, BRE framework, business logic, and associated formulae that calculate the derived scores from the asset's latest physical characteristics such as physical condition, performance, installation date, rehabilitation, or replacement. This presentation will focus on the design and implementation of the RDBMS tool and lessons learned. Attendees currently using spreadsheet tools to provide asset management decision support are encouraged to attend.

Room 201 August 30th, 2017 2:00:00 PM to 2:30:00 PM

Presenter: Mert Muftugil, GHD Inc.

Presenter Email: mert.muftugil@ghd.com

Title: Forever Forward: operation and maintenance strategies for the City of Annapolis water and wastewater infrastructure asset management program

Abstract: The City of Annapolis, Maryland provides water and sewer service to about 38,000 people with a network of approximately 130 miles each of water and sewer pipes of varying age and material. With its aging water and wastewater infrastructure, the City has become increasingly aware that significant reinvestment is needed to maintain and upgrade current assets. As a result, the City has initiated an asset management (AM) program with the focus on addressing the right assets, at the right time, with the right strategy to maximize the value realized from assets while minimizing the cost. Using the Environmental Protection Agency's framework for AM, the City is updating its buried asset inventories, developing condition ratings, and determining which assets pose the highest risk if they were to fail, all in an effort to prioritize operational and renewal investment effectively. Last year's presentation revolved around capital investment plans including: How the program has fine-tuned the pipe risk scoring process; different prioritization criteria and the estimated planning level cost for the water and sewer projects; introducing a collaboration system between the City Departments to improve the existing business processes. This year's presentation will discuss the City of Annapolis efforts to develop operation and maintenance (O&M) strategies for water and wastewater assets. Each O&M strategy includes the following attributes: Brief description of the O&M strategy and applicable assets; type and frequency of O&M activity (operation, maintenance, rehabilitation); cost (start-up and annual average sustaining costs); positions responsible for the O&M strategy; rationale for performing the O&M . In total, 24 strategies have been developed. The City is at different stages of implementation of these strategies. A RASIC matrix has been developed for each of the strategies to assign roles ("Responsible", "Approving", "Supporting", "Informed" and "Consulted") to City staff. In addition to results and outcomes, the presentation will review challenges faced by the City and lessons learned in addressing those challenges.

Room 201 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Craig Daly, Pure Technologies
Presenter Email: craig.daly@puretechltd.com
Title: Monetizing Risk - A Case for Assessing Mitigation Strategies
Abstract: Utilities require an efficient means of managing capital outlays and operational budget plans while providing realistic schedules and timelines to properly address any predicted shortages and difficulties as well as to minimize the impact of unforeseen failures and guard against other risks. The concept of risk is commonly used in infrastructure to optimize capital investment decisions and rudimentary risk management systems often act as a crutch to support a lack of better understanding. Standard cost planning practices entail quantifying the direct costs of capital investments and the associated operational and maintenance expenses along with remaining asset value while applying multiplicative safety factors to simplify the process of addressing project overruns and unexpected failures. This does not consider the underlying causes and reasoning behind the processes involved that can result in catastrophic events while the lack of an overarching financial component to risk management fails to identify cash-flow impacts including hidden costs and other externalities or to recognize opportunities for increased efficiencies. Without a well-thought out and established monetized risk approach, reasonable expectations to address these problems cannot be made nor can the risks associated with day to day procedures be properly managed. This paper will discuss how to approach the process of developing an overarching monetized rise framework for addressing the dangers and threats apparent to utilities in planning for capital expenditures or shortfalls while also providing some details on how individual processes might be modelled. This framework may not only be implemented with a detailed understanding of all the processes and costs associated with assets and failures but also in more simplified formats where basic assumptions must be made due to time constraints or lack of resource availability. This approach is also developed to be maintained and revisited over time to make better predictions and validate previous assumptions to provide a more robust and resilient modelling system. This paper will demonstrate the implications of using a monetized risk framework on various real data-sets and provide case studies to articulate the benefits of such an approach.

Room 201 August 30th, 2017 3:30:00 PM to 4:00:00 PM
Presenter: Amy Santos, Arcadis
Presenter Email: amy.santos@arcadis.com
Title: Innovations in Water Infrastructure Financing – Addressing the Water Infrastructure Gap
Abstract: The USEPA estimates that more than $600 billion of water and wastewater infrastructure investment is needed between now and 2028. The U.S. Conference of Mayors estimates this figure to be upwards of $2.8 trillion to address aging infrastructure, regulatory, and capacity needs. Today, there is a significant gap between the need to finance this infrastructure and the ability to finance these capital projects. The gap exists largely due to limitations and constraints on the willingness and ability of utilities to raise rates to fund capital programs. But, to what extent can new and emerging financing alternatives help the water industry address this gap? Can new and emerging capital providers be accessed to help utilities close the gap by reducing overall financing costs and unlocking additional capacity to finance more of the capital projects that are needed? What are the merits and limitations of these new and emerging capital financing alternatives and when does it make sense for water utilities to access them? This presentation will explore the answers to these questions, and will summarize the results of a recently published Water Research Foundation project entitled “New and Emerging Capital Providers for Infrastructure Funding” that was completed to identify capital providers and associated capital financing alternatives that may decrease costs, support stakeholder values, and align with future utility objectives. New and emerging capital providers to the water industry, such as Environmental, Social, and Governance (ESG) investors, socially responsible investors (SRI), private investors, and local community investors will be discussed, along with various capital financing alternatives such as green bonds, social impact bonds, crowdfunding, private placements, and public-private partnerships. Examples of how these alternatives have been used, or may be used, by the water sector will be provided including case studies of DC Water and Norfolk, VA.

Room 201 August 30th, 2017 4:00:00 PM to 4:30:00 PM

Presenter: John Smith, Engineering Design Technologies, Inc.

Presenter Email: josmithpe@gmail.com

Title: The Future of Asset Management using Unmanned Aerial Vehicles - How Corrosion Engineers are using Drones for Infrastructure Inspections

Abstract: The Future of Asset Management using Unmanned Aerial Vehicles: How Corrosion Engineers are using Drones for Infrastructure Inspections We are in the midst of a data and technology revolution. 2017 is being called the 'Year of the Drone'. Unmanned Aerial Systems ("UASs") and Vehicles ("UAVs") or as more commonly called "Drones" are being employed for asset inspection by a growing number of utilities throughout the world. The use of drones for asset inspection provides substantial improvements over traditional inspection methods, including benefits to safety, efficiency and data quality. For utilities that own, manage and maintain a vast array of infrastructure this technology is now providing substantial cost as well as management benefits. To prevent faults, service interruptions and significant accidents and damage, assets must be regularly inspected to detect any issues as early as possible. These techniques provides documentary evidence that is increasingly vital as infrastructure ages. Inspecting assets manually is a time-consuming and labor-intensive process that comprises a significant percentage of a utility's operating costs each year. In some cases, manual inspection of certain assets can also be dangerous. Recent developments in unmanned aerial systems (UAS) and vehicles (UAVs) look set to streamline and enhance the asset inspection process. As a result, UAV inspections are being trialed and adopted by a growing number of utilities. This presentation will provide a review of the state of the art on the use of UAV's in the infrastructure asset management in general and aerial surveys of pipelines in particular. The use of this data by corrosion engineering professionals (CEPs) compliments other non-destructive and non-intrusive data which allows CEPs to make better judgements regarding the assets. Also, drones are being used for confined spaces such as large diameter pipelines, tanks and pumping stations where manned entry is not feasible or considered safe. As a compliment to the use of UAV's, 360° Virtual Reality (360°/VR) is now being used for the presentation of inspection findings to utility owners and engineers for the evaluation of assets. 360°/VR provides 'virtual' access to the asset by the owners who cannot see and review the asset in the field. A discussion of the Federal Aviation Administration (FAA) requirements for flying drones in the Mid-Atlantic region will be discussed, including the licenses and permits necessary. A review of the FAA Part 107 Rules will be presented and how they apply to municipalities and utilities. This presentation will provide actual footage from recent pipeline and water tank inspections as a case study from several projects in the region. Included with these case studies will be a presentation on the recommended selection criteria and specifications for municipalities for employing UAV operators will be provided including a checklist of considerations.

Room 201 August 30th, 2017 4:30:00 PM to 5:00:00 PM

Presenter: Chein-Chi Chang, DC Water

Presenter Email: chang87@gmail.com

Title: Project Prioritization of Emergency Containment Planning for Climate Resiliency

Abstract: Due to the occurrence of natural hazard and other disasters, utilities are facing the challenge of sustainability to prevent or protect their facilities. Climate resiliency has been played by utilities as the important consideration for sustainability planning. One of the climate resiliency issues that utilities have is the emergency containment planning. The sewer emergency containment is a stoppage or containment of discharge of raw sewage which is comprised of environmental and health risks. A sewer emergency containment begins at the time it is confirmed that the unintentional discharge and ends when the active flow of sewage is controlled or contained. A Sewer Emergency Containment Plan outlines the roles and responsibilities, initial response actions, and communication protocols to be used in the emergency which climate change is one the causes for this kind of event. The document provides management and temporary repair information and guidance for the containment of sewer system infrastructure in the emergency event. The systems considered are pumping stations and the major sewer system. For utilities, there are many major facilities which may be required for preparing emergency containment planning. How to evaluate the priority for preparing this plan becomes the important consideration for utilities since there is the limited budget. Asset management can be an evaluation tool for utilities to prioritize the preparation of emergency containment planning for these facilities. In this presentation, we will discuss more details how asset management can be applied for this kind of planning.

Room 201 August 31st, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Ahmad Habibian, CDM Smith
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Title: Building the Digital Utility of the Future
Abstract: The digital utility of the future will be built upon five revolutionary technology trends: 1- Emergence of Industrial Internet of Things (IIOTs) 2- Mobile information communication technology, 3- Cloud storage services, 4- Data analytics, and 5- Social platforms. The digital utility will be able to leverage the data to improve operational efficiencies, save costs, and enhance customer service. The IIOTs include intelligent devices which can execute programmed applications and allow remote operation of various mechanical, electrical or communication systems. The IIOTs also include low cost sensors to measure and monitor performance and operational parameters, allowing utilities to have access to real-time data. The data can be easily transmitted through various available communication channels such as mobile and radio technology. The volume of data collected by digital utilities will increase by several orders of magnitude compared to the volume of data being collected today by traditional water utilities. In addition to data security concerns, organizing, storing and accessing such volume of data will be a challenge for many utilities and would require significant data warehousing capabilities and IT infrastructure. Cloud technology will play a key role in providing a platform for handling the Big Data. However, data by itself is of very limited value. It is the in-depth analysis of the data through data analytics that extract knowledge and actionable intelligence that utility managers and operators can use to optimize and improve performance, troubleshoot operations, reduce costs, enhance revenue, and improve customer service. Additional benefits can be realized through predictive analytics. Finally, the digital utility of the future will be able to communicate with customers through available and emerging social media platforms. The capability is there for customer to have access to the up-to-the minute consumption data, water quality data, and operation and maintenance alerts. The operators and managers of digital utilities of the future will have smart “Apps” on their mobile devices—powered by sophisticated data and predictive analytics—to help them monitor, optimize, manage and troubleshoot the assets and processes which are vital to the delivery of safe and adequate supply of potable water to their customers. This presentation will provide an overview of a road map to build a digital utility of the future. Each of the five pillars upon which the digital utility of the future will be built will be explored. The concepts presented will be illustrated through real-world examples of how the collected data can be analyzed through advanced analytic tools to gain invaluable insight and actionable intelligence.

Room 201 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Will Williams, Black & Veatch
Presenter Email: WilliamsWD@bv.com
Title: Taking the First Steps on the Asset Management Journey: How HRSD has developed and is implementing their Asset Management Program
Abstract: Hampton Roads Sanitation District (HRSD) is recognized nationally as a leading, innovative sewage collection and treatment agency, renowned for its forward looking approach to service delivery. As part of the ongoing evolution of the utility, HRSD has decided to adopt a good practice ‘asset management’ (AM) approach to managing the lifecycle of its wastewater collection and treatment asset base. As with many utilities in the US, HRSD understood the broad direction it wanted to go in but needed help in defining the exact scope and form of their asset management program, their current level of asset management ‘maturity’ and key improvement activities, their relative priority, costs and benefits. HRSD chose to undertake an independent assessment of their maturity against the ISO-55001 asset management standard and with consultant help identified key gaps and developed a three year improvement ’roadmap’. ISO-55001 has been in place since 2014 and has been adopted by numerous utilities in the US and worldwide as the framework against which to assess their current asset management activities and identify necessary improvements. The standard is structured around the ‘plan, do, check, act’ approach and covers 27 elements of asset lifecycle management arranged in the broad areas of context of the organization, leadership, planning, support, operations, performance evaluation and improvement. This presentation shares key lessons learned, discusses why HRSD chose the ISO-55001 approach, shares their experience of undertaking the assessment and outlines the direction of their AM program. It will provide an overview of the assessment approach undertaken at HRSD and will describe the scope of the ISO-55001 standard. The presentation will be of interest to any utilities considering implementing a similar AM program that want to know how to take those important first steps.

Room 201 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Mert Muftugil, GHD Inc.
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Title: City of Rehoboth Beach Drinking Water and Wastewater Infrastructure Asset Management Program
Abstract: The City of Rehoboth Beach is participating in Delaware's Wastewater and Drinking Water Asset Management (AM) Incentive Program, in which participants can receive funding to develop and implement asset management plans. The objective of this project is to develop an AM plan and procedural framework for the City's drinking water and wastewater infrastructure. The project is organized into two phases. Phase 1 establishes the AM framework the City will use. The framework not only includes the procedures needed to support the AM plan development but will also set the stage for the City's strategic approach to implementing asset management including alignment of the proposed framework with the City's objectives and goals, assessing the fundamental basis of AM, asset data and maintenance, and financial processes and practices. Phase 2 develops an AM plan for City's drinking water and wastewater assets. The AM plan includes future investment requirements for the next 20 years for City infrastructure. The AM plan also contains the list of recommended improvements and associated implementation schedule. To date, asset inventories for the City's buried and aboveground water and wastewater assets have been developed from site visits, record drawings, and O&M manuals. Each asset has been assigned a condition rating as well as a consequence of failure score, and a life expectancy. With this information used as input, asset replacement schedules and corresponding capital investment needs have been developed. The project is scheduled for completion in the Spring of 2017 and this presentation will discuss following: Development of asset hierarchy and inventory; determining condition, remaining life, and value of assets; business risk exposure assessment to identify critical assets with high failure consequences; developing capital projects from the input generated during the development of asset register and management strategy groups; development of the AM plan for the City's drinking water and wastewater assets.

Room 201 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Greg Pope, Delaware DNREC Environmental Finance
Presenter Email: greg.pope@state.de.us
Title: Implementing an Asset Management Incentive Program for Delaware's Public Wastewater and Drinking Water Utilities
Abstract: Delaware's Clean Water State Revolving Fund (CWSRF) currently provides low interest loans and grants to most of the 32 publicly owned wastewater systems in Delaware. Funding needs for capital improvement projects can be driven by many reasons such as regulations, condition/age of the facilities, growth and/or expansion, and regionalization. A utility with an asset management program is able to more effectively development these needs. Simply stated, asset management is the practice of managing infrastructure assets to minimize the total cost of ownership and operations, while delivering the customer's level of service. Why implement an asset management plan (AMP)? Asset management has numerous benefits to systems, including prolonging asset life, meeting customer demands, helping to ensure proper rate setting and budget planning, meeting regulatory requirements, and improving response to emergencies. To help the public wastewater utilities in Delaware implement asset management, the State's Department of Natural Resources and Environmental Control (DNREC) and the Water Infrastructure Advisory Council (WIAC) have created a Wastewater and Drinking Water Asset Management Incentive Program. Requirements of the program include: (1) The applicant must be a Publicly-Owned Wastewater or Drinking Water Utility; (2) Governing Municipal Governments must sign a five year agreement with DNREC to develop and implement a system-wide AMP; and (3) applicants are eligible to receive a no-match grant for their AMP. The AMP must be based on the following core components: (1) Asset Inventory, (2) Level of Service, (3) Critical Assets, (4) Revenue Structure, and (5) Capital Improvement Project Plan. The program was approved by both DNREC and WIAC in May, 2015, at which time they solicited for applications. In June 2015, four municipalities and one county were approved to implement asset management. There was so much demand for the program that in August the funding amounts were increased and a second solicitation was approved. Details of the Incentive Program such as funding, SRF interest rate rebates, and agreements between awardees and the State will be discussed. The Town of Millsboro was the first municipality to complete an AMP for both its wastewater and drinking water systems. This presentation will detail Millsboro's AMPs as a case study for the State's asset management program. The Town transferred all paper-space data to ArcGIS-based databases and created a base map of its water and wastewater systems using aerial photography and georeferencing of system Construction and/or As-Built Plans. Asset attribute databases were built around the ESRI local Government Data Model. Modeling was used within ArcGIS to assist with criticality analysis, and data layers such as floodplain maps, depth to groundwater and soil corrosive maps were added to the ArcGIS database. The project included field investigations such as Level 1 manhole inspections for Town-selected manholes throughout Town. The Level 1 manhole inspections were conducted by personnel who have been MACP (manhole assessment certification program) certified by NASSCO. Photos, videos and observations made were added to the ArcGIS database. The Town's recent CCTV surveying results will be presented, along with their effects on criticality of the collection system.

Room 201 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Ahmet Ozman, Black & Veatch
Presenter Email: Ozmanan@bv.com
Title: Improving Regional Resilience to Water Supply Emergencies
Abstract: In the event of water supply emergencies, the National Capital Region (NCR) has limited capabilities to transfer treated water between systems. Consequences could include loss of water service from days to a month or more depending upon the outage scenario. The direct and economic effects are estimated to be up to several billion dollars, depending upon the size and duration of the water supply emergency. The Metropolitan Washington Council of Governments (COG) and the NCR water utilities completed a Water Supply and Distribution System Resiliency and Redundancy study in 2016. The study evaluated the region's ability to withstand outages and service disruptions, and identified and evaluated potential infrastructure improvements to increase resilience of the regional water supply. NCR water utilities and COG worked to identify loss of service scenarios. Risk was quantified and defined by combining the likelihood of an event occurring and the consequence of its occurrence, measured in People-Outage-Days (POD). The study defined the desired Level of Service (LOS) as the ability to supply winter average demands during emergency events. A series of regional workshops identified and defined failure events for analysis. Risk mitigation options evaluated relative to regional benefit included: water storage, transmission, transfer, and system interconnections. The system carries a total Net Present Value (NPV) risk of $37 billion, based on the outage events analyzed. Potomac River contamination events represent a substantial portion of NCR water systems' total risk. Identified mitigation investments were analyzed by risk reduction and regional benefit, and grouped into portfolios. This presentation will review the study approach and evaluation of risk-reduction alternatives. The discussion will include regional governance and collaboration among water systems. Options for prioritizing mitigation options, project phasing, and financing strategies to implement the NCR resilience improvements will be explored.

Room 201 August 31st, 2017 11:30:00 AM to 12:00:00 PM
Presenter: Bisrat Abebe, DC Water
Presenter Email: bisrat.abebe@dcwater.com
Title: Piloting Emerging Technologies - Selection and Testing for Optimal Utility Management
Abstract: ABSTRACT: DC Water is making a concerted effort to identify technologies and practices that will enhance our ability to optimally manage our infrastructure. However, with so many new and emerging technologies available, DC Water wanted to employ a systematic way to select those emerging technologies that would most effectively address key performance indicators (KPIs) established as part of our Asset Management Program. These KPIs include items such as water main breaks, water quality complaints, and energy use. KPIs were developed for the five services areas in DC Water's distribution and collection system including: Water Linear, Water Vertical, Sewer Linear, Sewer Vertical and Water Quality. A sixth area was added as part of this process recognizing that 'big-data' and the analysis of collected data is indeed an asset for any utility. Using the six identified service areas and the KPIs developed as part of the Asset Management Group, a ranking system was developed to 'score' potential technologies. With this tool, a higher ranking identified those technologies that most effectively addressed DC Water's strategic goal to optimally manage our infrastructure. DC Water then selected the most favorable technologies to pilot test. Because a pilot test is intended to evaluate the feasibility and effectiveness of a technology toward the goal of optimal management, the pilot programs are developed to verify the following key questions: What are the perceived benefits (costs, time, others); How are the KPIs addressed and what signifies success; Who at DC Water will be responsible for the program; What are the required steps and follow-up questions; What is the proposed pilot budget and schedule; Follow-up questions that should be asked. Pilot programs have been developed and scheduled for the following six technologies: Linear Water - Spray in place pipe linear systems; Vertical Water - Pump optimization management; Linear Sewer - Smart manhole covers; Linear Sewer - Remote CSO management; Water Quality - Portable remote water sampling and monitoring; Big Data - GIS data management. Participants attending the conference will learn the following: DC Water's ranking tool to identify pilot programs to test; Key Performance Indicators related to water and sewer services; Pilot program development; Technologies that DC Water will be piloting.

Room 201 August 31st, 2017 2:00:00 PM to 2:30:00 PM

Presenter: John Helwig, GHD Inc.

Presenter Email: john.helwig@ghd.com

Title: Process Mapping and Its Critical Role in CMMS Implementations

Abstract: As water utilities embrace computerized maintenance management systems (CMMS) to improve their maintenance practices and bolster their asset management programs, there are potential pitfalls that they should be aware of before proceeding with implementation. If ignored, utilities can be left with an expensive tool that becomes underutilized and obsolete within a matter of months, and many implementations fail for the reasons presented herein. Developing the appropriate foundational datasets in addition to incorporating the principles of asset management and best practices in maintenance management are vital to exploiting the CMMS's benefits and ensuring its continued use in the long term. The case of a regional utility with a burgeoning asset management program building a CMMS from scratch will be presented as an illustrative example. This presentation commences with an overview of what the key foundational data sets are, common mistakes – or oversights – in their development, and what the latest best practices from reliability centered maintenance can teach utilities about transitioning from a reactive to a preventive culture through mapping and improving maintenance and operations workflows. In addition to developing good quality data, successful CMMS implementations connect maintenance management with the principles of asset management. Prior to even envisioning a CMMS, this utility realized that tracking opening and closing of work orders alone was an insufficient strategy; it wanted to track asset performance over time. To accomplish this, it developed management strategies for its water and sewer assets, which were then incorporated into the system configuration. In addition, small, but critical, organizational adjustments were made to ensure that internal knowledge of the tool was both propagated and retained, which entailed developing a core group of "power users" and developing a systems administrator position. Finally, the presentation will conclude with a presentation of the key performance indicators adopted by this utility; such as schedule compliance, uptime, downtime, planned maintenance ratio, etc.; to promote a culture of continuous improvement, particularly for utility still early in its asset management maturity. While it remains to be seen if the CMMS will be successful over the long term, this presentation will summarize the key decisions and changes this utility made to minimize this risk.

Room 201 August 31st, 2017 2:30:00 PM to 3:00:00 PM

Presenter: Kate Zhao, Pure Technologies

Presenter Email: kate.zhao@puretechltd.com

Title: Force Mains System Prioritization, Assessment, and Risk Mitigation in Emerald Coast, Florida

Abstract: Buried infrastructure is the backbone of our modern society. It connects communities, empowers our economy and enables everyday life. Utility managers have to make tough decisions every day to balance repairs and replacement of their ageing metallic pipe inventory. Emerald Coast Utilities Authority (ECUA) practice a data-driven decision making as part of an effective, comprehensive risk management program for their 315 miles force mains. Over 80% of the force mains consist of PVC pipes, and remaining include ferrous and AC pipes. During preliminary planning, a dynamic desktop risk assessment was performed to prioritize the overall system and identify sections of force main systems for further investigation. Depending on the pipe materials and failure modes, ECUA adopted different condition assessment plans and inspection techniques to understand the actual pipe condition and identify system operational issues. A phased approach pressure transient monitoring was carried out on a rotation basis for six month period. For developing long term management strategies, pipe deterioration and remaining useful life analysis was performed based on inspection data along with structural analysis results. Meanwhile the system is reprioritized using the additional information. This provided ECUA valuable information to identify the rehabilitation and replacement projects and to plan long term capital improvement.

Room 201 August 31st, 2017 3:00:00 PM to 3:30:00 PM

Presenter: Paul Sayan, Louis Berger

Presenter Email: psayan@louisberger.com

Title: Help! We've lost $4.5M and don't know what to do. A Budget Story from the Baltimore County Bureau of Utilities

Abstract: In August 2016, the Baltimore County Office of Budget and Finance informed the Bureau of Utilities that the fiscal year (FY) 2017 budget request for contracted sewer maintenance work was cut by nearly 50-percent. Work that was planned to be completed in the original fiscal year budget included sewer cleaning and inspection, chemical root control treatment, O&M program management and construction inspection services. Despite the budget cut, the Bureau of Utilities was still expected to maintain the County's level of service, which, at the time, was rudimentarily defined as minimizing the occurrence of sanitary sewer overflows and basement backups. Absent a formal asset management program, the Bureau of Utilities had to develop a plan that best maintained the County's level of service within the fiscal constraints. The final maintenance plan included using current County staff and equipment resources, expanding the County's SL-RAT inspection program to increase productivity and prioritize sewer cleaning work and delaying and prioritizing some contract work. Once the plan's general activities were identified, iterative schedule and cost estimate analyses were reviewed to determine the optimum use of County and contractor resources. The iterative process allowed the management team to better understand the advantages and disadvantages of each element within a plan; thereby, enabling the team to better and more clearly explain to the County decision makers the elements that were included in the recommended maintenance plan. The presentation will discuss how the FY2017 maintenance plan was developed, explain which stakeholders were involved in finalizing the plan and why those particular stakeholders were included in the decision making process and the results of the plan in maintaining County's level of service.

Room 201 August 31st, 2017 4:00:00 PM to 4:30:00 PM

Presenter: Tom Kiefer, Baltimore County

Presenter Email: ecarpenetti@hotmail.com

Title: Holistic Approach for Wastewater Infrastructure Asset Management

Abstract: Asset management is a process some water and wastewater utilities follow to make sure that planned maintenance and capital projects are completed on time and within budget. And when completed correctly the overall cost to maintain and repair/renew the system will be minimized, while delivering desired service levels. To accomplish this task municipalities have focused on monitoring key performance indicators through the development of detailed asset inventories, the development and execution of operation and maintenance programs, and the prioritization and completion of capital improvement projects. However, the sustainability and resiliency of the system is often over looked and is not being considered as part of the long rang budget forecast. Recently, Baltimore County initiated a review of historical data stored within the County's Maintenance Management Information System (MMIS) to quantify the sustainability and resiliency of the sanitary sewer system. Based on this review several sustainability and resiliency parameters were identified and further investigated. Preliminary results indicate that social, environmental and economic sustainability (customer complaints, SSOs and utility revenue) resiliency (Likelihood of Failure, emergency expense and acceptable recovery costs) parameters can be mined to extract valuable information and identify data gaps. During the presentation the County will explain how sustainability and resiliency parameters were identified and provide practical examples of how they can be used.

Room 201 August 31st, 2017 4:30:00 PM to 5:00:00 PM

Presenter: Jay Sakai, 4Tenets Consulting, LLC

Presenter Email: jsakai@fourtenets.com

Title: Performancestat: A new approach to operations management in the utility sector

Abstract: The words performance, efficiency, and accountability are ever-present in today's public sector management lexicon, and it's difficult to find a new chief executive, general manager, or agency director who isn't looking for new ways to improve the efficiency and effectiveness of his or her operation. Public utilities face the unique challenges of a changing regulatory environment: aging infrastructure, demands for better, more responsive customer service, and fiscal pressures from rates that aren't keeping pace with costs. Workforce attrition, cumbersome procurement and hiring practices, and shifting operational priorities have made true organizational transformation difficult to achieve within this industry . Fortunately, there is a model for a new form of operations management that has shown success in the utility sector. This model, which uses data analytics to support performance review and management oversight, was originally developed in the New York City Police Department in the 1990's and later adapted to municipal operations in the City of Baltimore. Since the inception of Baltimore's nationally recognized CitiStat program, dozens of similar "PerformanceStat" programs have been successfully implemented across a wide spectrum of municipalities, county governments, and state agencies. These programs are breaking down traditional barriers to progress and helping public sector organizations innovate and become more effective. Baltimore's program was credited with helping the City's Bureau of Water & Wastewater save ratepayers millions of dollars in operating costs and improving customer service delivery across the enterprise. The Washington Suburban Sanitary Commission's new WSSC Stat program is helping to transform that utility into a customer-focused, performance driven operation and has delivered measurable results in its first 6 months of operation. This presentation describes the benefits of adopting a "PerformanceStat" approach to operations management within the water and wastewater utility sector and discuss the nuts-and-bolts of implementing a "Stat" program within a public sector environment, highlighting common implementation pitfalls and keys to success.

Room 201 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Edward Shea, Greeley and Hansen
Presenter Email: eshea@greeley-hansen.com
Title: Defining Likelihood and Consequence of Failure Parameters Specific to Storm Drainage Systems
Abstract: As part of the Fairfax County, Virginia Maintenance and Stormwater Management Division's (MSMD) infrastructure re-investment efforts for the storm drainage system, projects are currently prioritized based on citizen service requests and physical condition assessments. There is currently not a standardized industry approach for assessing condition or remaining service life of storm drainage assets. MSMD initiated a project to identify and define the Likelihood of Failure (LoF) and Consequence of Failure (CoF) parameters unique to storm drainage infrastructure that will be used to support a risk-based asset management approach to reinvestment planning and prioritization. During the last ten years, MSMD has inspected more than 750 miles of the storm drainage system as part of its efforts to manage the nearly 1,300 miles of assets and to comply with the County's MS4 permit requirements. MSMD piloted the use of NASSCO PACP Quick Ratings for condition rating and repair prioritization, analyzed documentation of pipe failure histories from a database of more than 36,000 service calls recorded since 2009, developed a customized condition rating procedure specific to storm drainage systems and access structures, and developed a database for recording CCTV inspection data. These efforts led to a deeper understanding of the differentiating attributes of storm drainage system infrastructure condition and failure as compared to what is typically observed in sanitary collection infrastructure. The major service call categories that correlated to asset failure include sinkholes and flooding. Blockages, debris, and calls related to trees and vegetation were not factored directly into the LoF and CoF parameters as these complaints are typically resolved through ongoing maintenance. Parameters considered the County's level of service, which is generally to convey runoff for storm events having up to a 10-year return frequency. A facilitated workshop was used to engage MSMD and other Public Works staff in identifying and defining the key parameters that impact stormwater asset performance and failure impact. Attendance was cross-disciplinary, and included personnel with responsibility for taking and investigating citizen service requests, stormwater management BMP facilities, the storm drainage collection system, and also the wastewater collection system. Attendees included engineers, maintenance professionals, field staff, customer service call takers and inspection technicians, as well as senior management. Prior to the workshop, attendees were provided a brief questionnaire that served to introduce the workshop topics and generate preliminary feedback regarding the frequency and consequences of each failure mode. During the workshop, the questionnaire results and service call analysis were presented, discussed and debated with the goal of understanding the failure modes specific to stormwater systems. The results of the discussion have been refined to yield concise definitions of 15 parameters, using a five-point scale, which can be used in the asset management program.

Room 201 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Erin Steinwachs, City of Baltimore DPW
Presenter Email: erin.steinwachs@baltimorecity.gov
Title: Best Practices for Enterprise CCTV Management
Abstract: Utility asset management, and specifically collection management, is supported in part by condition assessments using closed circuit television (CCTV). This presentation will provide the audience with an understanding of enterprise solutions for the housing, integration, and leveraging of data associated with CCTV footage. Using industry standards and examples from other municipalities, I will provide a case study detailing the transition from an initial CCTV management plan to a current CCTV management solution that allows for more effective storage, condition assessments, and leveraging of the data. This data management system includes housing CCTV footage in a centralized location, leveraging data with application programming interfaces (APIs), and integration of data within a computerized maintenance management system (CMMS). Streamlined and comprehensive management of CCTV data allows for a more accurate characterization of wastewater assets in the pipe network infrastructure. This includes better access to condition assessments and digital imagery. The audience will gain a better understanding of how to implement a best practice based enterprise solution for the management of condition assessments of CCTV, how this solution relates to small and large municipalities, and how this solution supports a collection system management program.

Room 201 September 1st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: David Kerr, GHD Inc.
Presenter Email: david.kerr@ghd.com
Title: It's all About Risk: Capital Planning For Trunk Sewers Using The RAMCAP J100 Risk Standard
Abstract: Regional Municipality of Peel through its growth projections will be tasked with supplying over 2.5 million residential and commercial customers with a reliable and high quality water and wastewater services over the next twenty (20) years. In response to this unprecedented growth at the Region and its commitment to provide high levels of municipal services, a review of its trunk sewer infrastructure to ensure it can continue to deliver services that meet its customer's needs was warranted. The Region decided to build on the approach used previously for its water transmission and sub-transmission infrastructure to ensure consistency in its asset management practices. The Region decided to look at this linear infrastructure through the Risk Management Lens instead of a reactive approach to identifying projects. The project is intended to complete a risk and resilience assessment based on the RAMCAP J100 risk standard that will help the Region better understand and proactively manage threats and opportunities to the trunk sewer system. This presentation will include a summary of the 1) methodology; 2) asset characterization; 3) threat characterization; 4) Consequence Analysis; 5) vulnerability analysis; 6) threat analysis; and 7) risk and resilience analysis and management plan.

Room 201 September 1st, 2017 10:00:00 AM to 10:30:00 AM
Presenter: Michael Maker, Municipal & Financial Services Group
Presenter Email: michael.maker@mfsgllc.com
Title: Defining Affordability
Abstract: The US Environmental Protection Agency (EPA) has proposed that for community water systems a water bill is considered affordable if it is under 2.5% of the community's median household income (MHI). In separate guidance, the EPA has suggested that an annual residential combined wastewater and stormwater (addressing combined sewer overflows [CSO]) bill is considered affordable (not having a high "financial impact") if it is under 2.0% of the MHI for the respective service area. Based on these two findings, it could be inferred that the EPA considers a combined water, wastewater and stormwater bill to be "affordable" if it is less than 4.5% of MHI. This presentation will discuss several topics pertaining to the EPA's definition and determination of "affordability": (1) The increasing costs of providing (by utilities) and difficulty to pay (by customers) for water and sewer service; (2) Background on how the EPA settled on using MHI as the determining criteria for affordability and the percentages chosen for water and wastewater services; (3) Issues with MHI being used as the threshold for affordability and overview of industry guidance and best practices on affordability metrics and indicators.

Room 201 September 1st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Eyasu Yilma, DC Water
Presenter Email: eyasu.yilma@dcwater.com
Title: Potomac Interceptor Odor Control Facilities Optimization
Abstract: The Potomac Interceptor (PI) is a 50-mile-long gravity sewer system that transports wastewater to the Blue Plains Advanced Wastewater Treatment Plant (BPAWTP). The PI conveys approximately 20% of the flow into the BPAWTP. See the map below. The Potomac Interceptor sewer has a number of structures along its route to Blue Plains to allow sewage to flow efficiently and provide access for inspection and maintenance. However, during certain times of the year they can become the source of odor. Between 2010 and 2015 DC Water constructed six Odor Control Facilities along the main section of the Potomac Interceptor for the long-term abatement of odors generated by the sewer. The six sites are located in the District of Columbia (Site 1995), Montgomery County (Site 4, Site 17 and Site 27), and Loudoun County (Site 46). The objectives of the long term odor abatement program are: To provide long-term control of odors from the Potomac Interceptor using practical and reliable state of the art technology.To reduce hydrogen sulfide gases in the Potomac Interceptor that cause the corrosion of the concrete sewer pipe. However, the odor control facilities could not prevent 100% odor from being released from the sewer system due to various reasons. The main reason has been the penetration of a gas, called DMS that has not be considered during the design of the odor control facilities. There are also other reasons that caused the release of untreated air into the surrounding. This presentation will describe the various tasks that has been undertaken to optimize the operation of the odor control facilities. The odor control facilities optimization plan is programmatic approach to solve every type of problems that has caused malfunction to the odor control facilities, and any additional tasks that will maximize the efficient operation of the odor control facilities. DC Water has implemented the optimization plan in 2016 including dual media vessel retrofit to accommodate double media to be able to remove both H2S and DMS. The other tasks include media monitoring, differential pressure testing, and optimization of maintenance related activities. All six odor control facilities have been retrofitted between April 2016 and December 2016. The number of odor complaint dropped down from 50 a year to less than 10 just in 2016.

Room 201 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Bruce "Biff" Corning, Arcadis
Presenter Email: Bruce.Corning@arcadis.com
Title: Developing Metrics for Evaluating Attributes of Community Outreach/Public Engagement Programs
Abstract: This presentation will report on the experience to understand, measure and communicate the successful attributes of community outreach/public engagement programs that engender customer loyalty. We will report out on the understanding of which aspects of customer loyalty essentially gives the utility "permission to operate" and the underlying connection customers have to water services and products. The outcome of our research was to create an index of what has worked for utilities (and what hasn't worked) to begin to develop metrics that address: the value/benefit that is created by an emotional connection with customers and the community in an organization's public engagement and/or communications strategies; program elements that leading organizations are using to develop an emotional connection with customers and the community and to provide an evaluation of these programs including cost, internal (and/or) external staff requirements, etc.;how organizations can assess the resources required to implement these programs; a measure for organizations to assess the success or efficacy of these programs and how organizations define customer emotions, connect with these emotions, and link these efforts to results. The purpose of this work that is behind this presentation is to address the fact that to date, limited research has been conducted on the effectiveness of expanding community engagement beyond the project or acute issue level. As utilities continually improve communication techniques, it becomes clear that a comprehensive engagement strategy could develop thoughtful and sustainable connections with the community at large which may then translate into an increased understanding of the value of water, promote water stewardship, and financial support for utility programs and needs. In recent years, progressive utilities are increasingly moving toward such holistic programs. However, to date, the industry has not evaluated why, how nor whether a holistic strategy bears measurable benefit. The private sector faces a different set of challenges from the water utility sector, yet at the basest level, both sectors are dependent upon the same critical success factor: public willingness to pay. Much has been published regarding market capture, brand awareness, and advertising strategy to determine best practices in consumer product loyalty and customer engagement. As our society moves away from traditional media (e.g., print, television) and toward an online, omni-channel environment, the private sector is forging new pathways to differentiate products and increase sales. Metrics no longer focus solely on the bottom line business impacts and overall customer satisfaction, but delve deeper into customer segmentation and drivers of decision-making. The overall goal of this presentation is to present our understanding of the measures that communicate the successful attributes of community outreach/public engagement programs that engender customer loyalty.

Room 202 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Patrick Dunlap, Black & Veatch
Presenter Email: DunlapPJ@bv.com
Title: What do we know about Sidestream EBPR? Benefits and Opportunities to Improve Process Resiliency!
Abstract: During optimal performance, Enhanced Biological Phosphorus Removal (EBPR) can successfully remove ortho-Phosphorus to below 0.1 mgP/L. However, at times the influent flow rates and characteristics may not be favorable for EBPR when using conventional designs, whether due to not achieving good anaerobic conditions, low availability of short chain carbon (VFAs), competition between Phosphorus Accumulating Organisms (PAOs) and Glycogen Accumulating Organisms (GAOs), or other factors. In these events, Chemical P trimming is frequently implemented at significant cost and to the detriment of EBPR stability. Achieving reliable EBPR will maintain permit compliance and also reduce operating costs compared to using Chem P removal for effluent trimming. Recent work has shown the advantages offered by sidestream anaerobic zones in the group of processes referred to as sidestream EBPR (S2EBPR). In these processes fermentation and P release take place in a common reactor which does not receive primary effluent. These configurations can lead to more consistent EBPR performance and more efficient utilization of available carbon; both of which will lead to improved process stability and reduced operational costs. Understanding the specific mechanisms at work is the subject of ongoing research, including a WERF project, but the advantages are likely due to selective pressures in the sidestream environments which operate at longer retention times & higher solids concentrations; resulting in significant amounts of hydrolysis, higher soluble carbon residuals, and lower oxidation-reduction potential (ORP) values. These conditions can lead to improved VFA production, the selection of PAOs over GAOs, and the selection of fermenting PAOs such as Tetrasphaera and improved denitrification. This paper will be of interest to EBPR facilities interested in reducing chemical costs and to facilities not currently using EBPR due to adverse wastewater characteristics as it opens up more options to implement the upgrade. Facilities currently utilizing EBPR could implement these processes with minor modifications in order to provide a more efficient location to add supplemental carbon and to take advantage of these selective pressures on PAOs. As the father of Biological Nutrient Removal, James Barnard has spent his career developing and improving BNR processes. The new understanding offered by this ongoing research is helping to make sense of previous observations throughout his career. This paper will present some background on this history of EBPR and S2EBPR, go through recent research and results of plants operating with the recommended configurations, and provide recommendations for implementing S2EBPR at different facilities. The paper will introduce water resource recovery facilities (WRRFs) to new process philosophies around EBPR which, when implemented, have the beneficial result of improving P removal reliability and consistency; and of more efficiently using available carbon to that end.

Room 202 August 30th, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Kristi Perri, HDR
Presenter Email: Kristi.Perri@hdrinc.com
Title: Planning Ahead: Selecting and Sizing a Centrate Treatment System Prior to Anaerobic Digester Start-Up

Abstract: Howard County's Little Patuxent WRP (LPWRP) utilizes an anaerobic / anoxic / aerobic (A2O) process followed by denitrification filters to achieve the Chesapeake Bay ENR discharge limits. As part of the Biosolids Improvements Process, the existing biosolids handling facilities will be upgraded to provide new anaerobic digesters which will generate significant nitrogen and phosphorus recycle loads. Excessive nitrogen loads can increase energy costs, disrupt overall plant performance, and reduce effluent quality. High amounts of phosphorus in the recycle loads can result in unwanted struvite formation, increase chemical demand, and reduce effluent quality. In order to mitigate these impacts, the recycle loads were determined and nutrient removal processes were designed to treat them. Process model runs were completed utilizing BioWin to estimate the nutrient loads associated with the anaerobic digestion process and to develop a plant-wide mass balance. The County opted to implement a centrate treatment system utilizing the deammonification process to reduce the recycle nitrogen load. An innovative struvite precipitation process upstream of the dewatering process was selected to reduce the phosphorus recycle load and mitigate struvite formation in the downstream deammonification process. The preliminary evaluation process included two sequencing batch reactors (SBR) and two flow-through reactors: provided by World Water Works Demon® (SBR, flow through), Kruger Anita MoxTM (flow through), and Suez CleargreenTM (SBR). The new deammonification process will include centrate equalization storage that will allow the County to produce centrate five days per week but maintain a constant flow through the deammonification process. The preliminary evaluation indicates that a flow-through system will be better suited for the existing site constraints including construction of the new process within existing abandoned rectangular basins that have a limited side water depth. The existing basins are located adjacent to a pipe gallery that can be used to house equipment associated with the centrate equalization and deammonification processes. This presentation will include the evaluation results and the selected process based on the best overall value for the County. The presentation will also present the design layouts and discuss the process instrumentation and controls strategies to be implemented for the centrate equalization and deammonification processes. Typically, a centrate treatment process, like deammonification, is implemented at a facility with an established anaerobic digestion treatment process. However, at the Little Patuxent WRP, the anaerobic digesters start-up and stabilization will have to occur during the Biosolids Improvements Project. Strategies developed for starting up the anaerobic digestion process and the deammonification process will also be discussed.

Room 202 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Mary Sadler, Hazen and Sawyer
Presenter Email: msadler@hazenandsawyer.com
Title: Evaluation of Nutrient Trading Policy to Support of Nutrient Strategy Development in Falls Lake Watershed

Abstract: The City of Raleigh commissioned Hazen and Sawyer to investigate the potential impacts of onsite sewer disposal systems (OSDS) in the nutrient-impaired Falls Lake Watershed. The study objectives were to provide a literature review perspective on the OSDS issue, an evaluation of approaches to assess nutrient load contribution, and an analysis of various water quality trading and credit policies in other states specific to nitrogen and/or phosphorus. The overall objective of the analysis was to provide a balanced perspective on the OSDS issue coupled with an analysis of nutrient point to nonpoint source trading strategies to help facilitate the development of a trading policy framework for the Falls Lake watershed. This paper will summarize the findings of this study with respect to nutrient trading policy. There are multiple factors that influence OSDS nutrient contribution to water quality impairment. It was clear that the cause and effect link to eutrophication impairment is not straightforward. While there is agreement that onsite systems contribute to nutrient enrichment, there is disagreement regarding the extent and magnitude of impairment from these systems coupled with the long-term effects of small continuous nutrient inputs to the environment. Studies provide conflicting evidence regarding effluent quality from onsite systems or the fate and effect of nutrients via soil attenuation relative to groundwater movement. This issue is reflected in estimates of the percentage of nitrogen contribution in receiving waters as ammonia or nitrate. Other factors may include the atmospheric deposition relative to OSDS. The water quality trading strategies that were selected for review included an overall framework for point to nonpoint source trading or had specific guidelines for trading between point sources and septic systems. Fact Sheets were developed for the Chesapeake Bay, Connecticut, Idaho, Maryland, Massachusetts, Minnesota, Ohio, Pennsylvania, Virginia, and Wisconsin trading programs. Each Fact Sheet included a detailed description of the trading program, the type of nutrient credit and credit price, who can buy or sell credits, the availability of septic system credits, specific trading examples, and relevance to the Falls Lake Nutrient Strategy.

Room 202 August 30th, 2017 1:30:00 PM to 2:00:00 PM
Presenter: Peter Schuler, Brown and Caldwell
Presenter Email: pschuler@brwncald.com
Title: Startup and Operation of the Marlay Taylor WRF New 6-MGD BioMag System
Abstract: The objective of this project was to utilize Evoqua's BioMag system that utilizes magnetite to ballast the mixed liquor to greatly enhance settling to cost effectively provide enhanced nutrient removal (ENR) at MetCom's Marlay Taylor Water Reclamation Facility (WFR) in St. Mary's County, MD as part of the Chesapeake Bay Nutrient Reduction effort. The use of the BioMag treatment process in a 4-stage Bardenpho arrangement produced an ENR quality effluent without additional activated sludge tankage, secondary clarifiers or tertiary filters, which saved MetCom a significant amount of capital expenditures. It should be noted that this is one of the two largest BioMag facilities currently in operation. This presentation focuses on the startup of the new BioMag treatment process that occurred over several months in Spring and early Summer of 2016 to provide a roadmap for other municipalities that may be interested in this process. The presentation will include lessons learned during the startup and operation of this relatively new process. 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 4 MGD and producing an effluent with the following parameters: TSS / BOD = < 5 mg/L, Total Nitrogen = <3 mg/L and Total Phosphorus = 0.2 to 0.3 mg/L.

Room 202 August 30th, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Ezgi Kurdoglu, Maryland Environmental Service
Presenter Email: ekurd@menv.com
Title: Operational comparison of Micro Filtration and Ultra Filtration Membrane Bio-Reactors and key factors impacting start up.
Abstract: Two State facilities; a Veterans Home and a Corrections Facility where the Maryland Environmental Service (MES) operates wastewater treatment plant recently were upgraded to Membrane Bio-Reactor (MBR) to be able to comply with the anticipated future trends of more stringent nutrient discharge limits from the Maryland Department of Environment (MDE) and the aging infrastructure at the facilities. Two different types of MBR systems were constructed and are currently in operation. The aim of this paper is to provide an operational comparison of two different kinds of MBR system and a comprehensive understanding of key factors impacting MBR startups. The Membranes that was installed at the Veterans Home WWTP with a pore size of 0.4 µm perform micro filtration (MF), MLE process with an anoxic zone, an aerobic zone and internal recycle. Membranes installed at the Correction Facility WWTP with a pore size of 0.04 µm perform ultra-filtration (UF), Simultaneous Nitrification-Denitrification (SnDn) with a separate anoxic zone. Prior to start up seed sludge quality was tested for filterability, Specific Oxygen uptake rate, MLSS, MLVSS, and COD. One of the biggest challenges during the start up was the distribution of the biological loading. Initially partial flows were sent to the new plants in order to keep the existing plants running. The system performance was continuously monitored for an extended period to compare filtration characteristics and effluent quality in each system. During the start up foaming was not observed at these two locations. However foaming is a critical issue to be monitored as part of start up procedures.The performance comparison of MF and UF MBR systems has been analyzed for different parameters including operating air scouring requirements, temperature, flux rates, permeability, TMP, and CIP cleaning frequency. Average operating flux rates for MF and UF membrane system are 8 gfd and 5 gfd respectively. The UF system operated at a higher Transmembrane Pressure (TMP) compared to the MF membrane system. Also, this system has more stringent nutrient limits which require the addition of external carbon and alum for phosphorous removal. By operating at higher TMP, the energy required to achieve filtration increases. Also, frequent membrane cleaning is required, increasing the operating costs significantly as a result of cleaning agents and production downtime.

Room 202 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: William Meinert, OBG
Presenter Email: Bill.Meinert@obg.com
Title: Alphabet Soup: MBBR Startup Ain't exactly ENR or IFAS! Lessons Along The Way to Optimization
Abstract: A 3-MGD WWTP in the upper reaches of the Potomac River watershed was started up - first BOD / Nitrification in 2015 then advanced nutrient removal in 2016-7. The WWTP Upgrade project was comprehensive, and included: CSO Treatment, Headworks Screening and Grit Removal, Influent Pump Station, Upgrades to Primary and Secondary Clarification, New Moving-Bed Biofilm Reactor biological treatment configured with multiple pre-anoxic, swing, oxic, post-anoxic, and reaeration zones and trains with Gallery; Upgrades to Chlorination / Dechlorination disinfection, Mechanical Sludge Thickening & Dewatering with Volutes, Liquid sludge storage, Anaerobic Digestion upgrades, Coagulant / Carbon / Polymer chemical storage & feed, and new Operations Building. MBBR allowed a smaller footprint conducive with construction sequencing that allowed the existing constrained site and modified plant to stay operational throughout construction. MBBR equipment and system was pre-purchased to accelerate the project and control costs. The project had two main phases to achieve the existing NPDES Permit under Phase 1 and advanced nutrient removal under Phase 2 in order to comply with Chesapeake Bay Program requirements. The plant's hydraulic capacity was increased, incorporating high-rate ballasted (CoMag) clarification to polish solids and phosphorus as well as provide CSO treatment - enhancing the City's Long Term Control Plan compliance. The presentation will highlight the $52M project and also review process fundamentals and distinguish MBBR from conventional suspended activated sludge and Integrated Fixed-Film Activated Sludge (IFAS). The similarities and differences between MBBR and other biological treatment systems will be discussed, especially how the differences impacted startup, troubleshooting, and optimization of the treatment system 2015-7. Critical system components including aeration blowers and air distribution, on-line analyzers, and SCADA will be discussed. DMR and in-plant operating data will be presented. City contingency plans for remaining wastewater needs and pending phases of the Chesapeake Bay Program will be noted.

Room 202 August 30th, 2017 3:30:00 PM to 4:00:00 PM
Presenter: Samuel Jeyanayagam, CH2M
Presenter Email: samuel.jeyanayagam@ch2m.com
Title: Wastewater Treatment in an Energy- and Carbon-Constrained World
Abstract: Our current wastewater treatment philosophy is primarily focused on meeting effluent limits. Energy and resources are assumed to be cheap and unlimited, an untenable operating scenario. This presentation reviews the opportunities available for today's plant to evolve as water resource recovery facility (WRRF) of the future. Underpinning this transformation is efficient carbon management wherein carbon (cBOD) is considered not as a pollutant that must be removed but as a valuable resource that must be recovered. In a carbon- and energy-constrained world, the WRRF of the future will need to adopt strategies that seek to optimize the use of influent carbon for: (a) energy production; (b) nutrient control; and (c) resource recovery. Using case studies, this presentation will demonstrate how WRRFs have been able to achieve efficient carbon management. Case Study 1: VandCenter Syd (VCS), the 3rd largest water and wastewater company in Denmark, operates the Ejby Mølle WWTP, which is a 385,000 Population Equivalent BNR facility. In an effort to align with VCS's corporate goal of energy self-sufficiency and carbon neutrality, several Energy Optimization Opportunities (EOOs) were identified, modelled, and evaluated resulting in the Implementation of several EOOs, which allowed the plant to achieve energy self- sufficiency. Case Study 2: NEW Water (Green Bay Metropolitan Sewerage District, GBMSD) operates a 63.4 mgd plant. The Resource Recovery & Electrical Energy (R2E2) project identified 73 solids unit processes, which led to the implementation of the following to meet the GBMSD's energy goals: (a) Electricity and heat recovery from biogas; (b) Thermal oil & heat recovery, potential use of incinerator ash; and (c) Nutrient recovery. Case Study 3: Water Environment & Reuse Foundation (WE&RF) has embarked on several resource recovery research projects. Two are outlined here: Recovery Carbon and Other Commodity Products (Project # NTRY3R13). This study revealed that the following product groups are the most promising candidates for recovery: volatile fatty acids (VFAs), polyhydroxyalkanoates (PHA) or bioplastics, alcohols, and products from microbial electrolysis cells (MECs). Recovery of Plasmids and Rare Earth Elements (Project #NTRY8R15). Plasmids, are small rings of DNA that bacteria use to transmit information. Rare earth elements (REE) have unique properties and serve niche functions in a variety of technologies in health care, renewable energy, electronics, transportation, and manufacturing. The focus of this WE&RF project was to quantify the amounts of plasmids and REE found in WRRF influent, review recovery routes, determine market value, and identify knowledge gaps. Conclusion: In order to cope with the practical realities of the 21st century and beyond, today's treatment approach focused on removing pollutants must give way to a new paradigm focused on recovering resources. Technology is not the barrier to optimizing the use of available carbon. Rather, it is the lack of a socio-technological methodology to select and implement the most appropriate solutions based on plant-specific factors.WRRFs will have at their disposal many routes and several destinations with respect to carbon management. Since disruptive changes cannot be implemented overnight, utilities should embark on developing a roadmap for action.

Room 202 August 30th, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Ladan Holakoo, GHD Inc.
Presenter Email: Ladan.Holakoo@GHD.com
Title: Challenges of Chemical Phosphorous Removal with Long SRT Operation in ENR Plants
Abstract: Wastewater treatment plants designed for Enhanced Nutrient Removal (ENR) often operate at longer Solids Retention Times (SRTs) than conventional activated sludge facilities. This is particularly true for membrane bioreactor (MBR) plants. While long SRT operation ensures complete nitrification, operating at long sludge ages can generate a significant amount of humic substances and colloidal matter due to decay which could interfere with phosphorous-metal hydroxide complexations. This interference can cause ineffectiveness of the metal salt products in chemical removal of ortho-phosphorus. A case study of the Northeast River Advanced Wastewater Treatment Plant (WWTP) will be used to show how operating at very long SRTs can make chemical phosphorus removal less effective and emphasizes the importance of solids inventory management for nutrient removal operations. This is particularly important for plants operating at DOs less than 2 mg/L on average, like oxidation ditches with surface aerators, where the minimum required SRT is higher to make up for the lower growth rate of nitrifiers. When the 4-stage Bardenpho process was first upgraded for ENR operation in November 2015, the plant exceeded design nitrogen and phosphorus removal goals. However, as the operators increased SRT to more than 50 days, effluent ortho-phosphorus increased significantly despite increased dosage of poly aluminum chloride (PAC). The effluent ortho-phosphorous increased from 0.03 mg/L at an average PAC feed rate of 38 gpd to 1.3 mg/L at 70 gpd of PAC. With decreasing the SRT, the effluent ortho-P decreased to 0.32 mg/L at 72 gpd of PAC within the first month and is expected to further improve as the plant stabilizes at shorter SRT.

Room 202 August 30th, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Kevin Frank, AECOM
Presenter Email: kevin.frank@aecom.com
Title: Achieving BNR with Bioaugmentation and High Purity Oxygen: Technology Review and Process Modeling Leads to Successful Startup of the Harrisburg AWTF BNR Retrofit
Abstract: A presentation was made at TriCon a few years ago discussing the process evaluation of the Harrisburg AWTF, a 38 MGD high purity oxygen plant in PA, for meeting its new discharge loading limit of 688,575 lbs/year. This presentation will provide a brief review of the previous evaluation findings plus discuss new full-scale startup and operating performance. A review of operating data, an intensive sampling program, flows, loadings, and wastewater characteristics was carried out. In parallel, a global review of bioaugmentation technologies was carried out. This information was used to calibrate and validate a process model using the Mantis2 model from Hydromantis. The maximum specific nitrification growth rates were lowered from the defaults of 0.9 and 1.0/d for AOBs and NOBs, respectively, to 0.59 and 0.69/d to account for pH suppression effects. The technology review underscored the uncertainty of bioaugmenting in a mainstream system with a nitrifying biomass grown in isolation (segregation). The potential for shock from changes in temperature, pH, osmotic pressure, as well as response to substrate concentration changes and susceptibility to predation are often cited. Bioaugmentation technologies address this concern in varying degrees by coupling the sidestream system to the mainstream by “back-seeding”, or, feeding RAS back to the sidestream system. AECOM found that all sidestream systems could be categorized as follows: Category I – Little or no RAS (< 2%) returned to the sidestream (CAT 1) and Category II – The majority of the RAS (60 -100%) incorporated with the sidestream (CAT II). The alternatives selected for simulation were a CAT I system, and a CAT II system in which 100% of the RAS was employed in sidestream treatment (RAS re-aeration with sidestream added). Given the uncertainty of bioaugmentation for CAT I systems due to inconclusive pilot plant results, conditions of 0% and 100% nitrifyer survival when transitioning from the side-stream plant to the main-stream plant for the CAT 1 system was employed. Consistent with full-scale experience, the CAT II system was simulated assuming 100% efficiency–RAS re-aeration has mainstream conditions. This CAT II bioaumentation process has been referred to as RAS regeneration. The CAT I system modeled was based on m2t's proposed InNitri segregated sidestream treatment (SSST) process. The CAT II system modeled was based on the same mainstream process with RAS regeneration integrated sidestream treatment process (ISST). The results showed that the CAT II system had the most robust performance. Budgetary estimates show the CAT II system as lower than the CAT I system. Following design and construction of the upgrade, the process was started up in late April 2016. The process flow diagram of the constructed system will be shown and discussed. Full nitrification was realized in early May of the same year. Methanol addition to the post-anoxic zone commenced in late May. The process has been performing admirably and better than the process modeling predictions for the observed loadings; the effluent ammonia, nitrate + nitrite, and TN have respectively come down to 0.1 mg/L, 1.0 mg/L, and 2.0 mg/L.

Room 202 August 31st, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Jason Gillespie, Maryland Environmental Service
Presenter Email: jgill@menv.com
Title: Working Smarter: Paperless Field Data Collection and Data Management for NetDMR Reporting
Abstract: The Maryland Environmental Service (MES) developed a field data entry program for complete paperless reporting at its Dorsey Run wastewater treatment plant (WWTP) to reduce repetitive, duplicative tasks and increase accuracy of data collection, reporting, and notification of significant events. The previous system consisted of treatment plant operators hand writing discharge data onto a paper form, a Senior Operator compiling the data onto a master copy, and then transferring the data to an electronic spreadsheet at a later time.The new pilot program uses cellular enabled tablets to collect field data and automatically import field information into an existing water management database (WIMs) daily. Since the implementation of this pilot program, three (3) measures of environmental benefit and productivity have increased significantly. The first area of improvement was accuracy of the information. Previously, field data was hand written onto a form called the monthly operating record (MOR). Several calculations were then performed manually with the outcome of these calculation effecting plant operations. The new tablet program has eliminated manual calculation errors and automatically notifies operators when critical operational data approaches or exceeds operational thresholds. The second area of improvement is increased accountability. The tablet program uses Near Field Communications (NFC) and GPS locations to insure critical field measurements are being made at the correct locations. This improves accountability of all field measurements and validates the information. In addition NFC and GPS location service, all dates, times and hold times are automatically logged and increase the time available for operators to work on site. The third area of improvement is reduced labor and paper use. By having the data sent to our WIMs database every day, the end of the month preparation of MORs is completely eliminated. All the field data is available for automated review at the end of every day. This has greatly improved the ability to identify and correct operational issues before they become operational problems. MES gained approval from The Maryland Department of the Environment compliance program to continue the pilot program for complete paperless reporting. In October 2016 the Dorsey facility completed all NPDES reporting and record keeping paperless. All field data, daily logs, calibration records and process information was collected on tablets. The pilot program process culminated at the end of every month with all laboratory data, monthly operating records and discharge monitoring reports being submitted 100% paperless on NetDMR.

Room 202 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Billy Fox, HDR
Presenter Email: billy.fox@hdrinc.com
Title: Are You Operating with Situational Awareness? - Practical Techniques and Application of High Performance Human Machine Interface within the Water/Wastewater Industry
Abstract: One of the latest trends in SCADA systems is the “High Performance Human Machine Interface (HMI)” concept. This concept is also referred to as “Situational Awareness”. The general principles of this concept were outlined in the book “The High Performance HMI Handbook”, and the concept represents a significant paradigm shift in how graphical displays for SCADA systems are developed and how operators interface with the process control system. The complete adoption of these principles presents challenges within the Water/Wastewater environment, however one approach to leveraging this concept is to implement selected concepts of a high performance HMI system as part of your existing SCADA system. This presentation will provide an overview of the High Performance HMI principles, and will focus on ways to incrementally implement this system in the Water/Wastewater environment to give process data context and provide useful information that allows operators to understand what is happening in their control systems so that they can make appropriate and timely decisions. We will provide Water/Wastewater specific examples of implementing selected high performance HMI techniques on actual SCADA graphics, comparing the “before” and “after” views for discussion.

Room 202 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: John Cannon, GHD Inc.
Presenter Email: john.cannon@ghd.com
Title: Transferring O&M Information to a Web-Based Format
Abstract: Operation and Maintenance Manuals are critical documents for plant operators to have when running a treatment facility. Too often these important documents are delivered by manufacturers in paper binders which degrade over time, or on portable disks that are easy to misplace. There are benefits to operations staff for having O&M manuals maintained digitally and stored in a central location. But simply digitizing O&M manuals only scratches the surface of the possibilities that exist in the modern work environment. With current technology it is relatively simple to transfer O&M information to a web-based format that can be accessible from computer terminals or even mobile devices. This format is not limited solely to equipment manuals, but can be expanded to include other critical documents such as record drawings, operational logs, training videos, discharge permits, and more. This computerized O&M information can stand alone, or can be incorporated into a Computerized Maintenance Management System. This presentation will review the development and implementation of a Computerized O&M manual for the Aberdeen Advanced WWTP. Upgraded in 2013 to meet Maryland's strict Enhanced Nutrient Removal permit limits, the Aberdeen plant operators found themselves with a host of new equipment to integrate into their usual operational routines and maintenance schedules. While the contractor did provide a fourteen-volume set of binders containing information for the new equipment, it was difficult to quickly index the necessary information. A computerized version of this manual was developed to enhance the operators' ease of access to information about their new plant. In addition to including references to the manufacturer manuals, the computerized manual also updated the O&M information for the exiting treatment equipment, organized all of this information in an easy-to-use, web browser-based format, and included a graphical interface for quick reference by operations and maintenance staff. The final product was designed to be hosted on the client's internet network, where it can be accessed from any internet-capable device by any user with the proper clearance.

Room 202 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Isaac Katz, OBG
Presenter Email: isaac.katz@obg.com
Title: WWTP Process Leftovers – How Much Can We Squeeze in That Is Green and Sustainable?
Abstract: Although we design and build wastewater treatment plants around a central process, it is in reality only a small part of the daily life of the plant. The larger plant is teeming with activity, from liquid streams, to air streams, chemical streams and waste streams from both inside and outside the plant fence. Almost every part of the wastewater treatment plant process creates some sort of waste. You can find them in many different forms and in many different locations but the mass balance of the plant tells us that the cleaner you want your effluent, the more that needs to be removed. They are a daily issue that must be considered by plant operators. Staff must deal with them, figure out how to process and dispose of them, and they don’t even help with the main process! Unless they could. More and more, wastewater treatment plants are finding ways to not just dispose of their various waste streams but to use them in ingenious ways. As part of a new 2.8 MGD wastewater treatment plant upgrade we were tasked with a set of zero-energy goals. The goal; create as much energy, reuse and green infrastructure as possible through the parts of the process that you would normally just throw away. This presentation will explore these various process leftovers, how we incorporated them into the design and how each is helping to make the plant just a little greener. These processes include: Heat recovery on both influent and effluent stream, COGEN using anaerobic digestion gas, food to waste receiving center for introduction to digesters, sidestream treatment for better nutrient processing, reuse of effluent water for irrigation, utility water off effluent for plant processes, geothermal, solar and wind energy and green roofs. Owners, operators and design professionals listening to this presentation can gain a better understanding of some of the technologies available to a plant today as well as key components to look for during the design process and how all of these seemingly unrelated parts of the plant can be incorporated into a more sustainable final product.

Room 202 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Brianne Nakamura, Water Environment Federation
Presenter Email: bnakamura@wef.org
Title: WEF Road Maps for the Utility of the Future – Energy, Nutrients, and Reuse
Abstract: As the industry shifts from dependability to sustainability, utilities are searching for ways to better utilize their resources. WEF believes that wastewater treatment plants are not waste disposal facilities, but rather water resource recovery facilities that produce clean water, recover nutrients, and have the potential to reduce the national dependence upon fossil fuel through the production and use of renewable energy. As part of our efforts to help utilities shift towards resource recovery, WEF has developed three roadmaps as a reference point to get the conversation started. Why roadmaps? These high level, non-prescriptive documents help give all stakeholders an opportunity to educate themselves on some of the best practices and tools out there geared towards resource recovery. This presentation will look at some of the industry trends in resource recovery, as well as the available tools that WEF has produced throughout the years, including the Energy Roadmap, Nutrient Roadmap, and the recently (at WEFTEC 2016) released Water Reuse Roadmap!

Room 202 August 31st, 2017 11:30:00 AM to 12:00:00 PM

Presenter: Damann Anderson, Hazen and Sawyer

Presenter Email: danderson@hazenandsawyer.com

Title: Onsite Water Reuse: A Shortcut to Reclaimed Water Irrigation and Reduced Nitrogen Loading

Abstract: Approximately 25% of homes in the U.S. rely on onsite sewage disposal systems (OSDS, typically septic systems) for wastewater treatment and disposal, and the recent development of numeric nutrient criteria and TMDLs for surface waters has led to concerns over nitrogen loading to certain water bodies where water quality is impacted. Hazen and Sawyer recently completed research for the Florida Department of Health to develop and test nitrogen reducing technologies for OSDS as a means to protect water quality. One concept studied was onsite water reuse, where household wastewater was applied to the landscape for treatment and nutrient uptake prior to groundwater recharge. This concept is applicable to many areas in the U.S., such as Chesapeake Bay, where nitrogen loading from OSDS needs to be addressed. First, pilot testing of various treatment process configurations and media was accomplished over a two-year period. A two-stage biofilter process treating septic tank effluent (STE) was selected for its performance and ease of operation in the pilot study. In a two-stage nitrogen removal biofiltration process, the first stage provides ammonification and nitrification via a porous media biofilter and the second stage provides denitrification via an anoxic biofilter with reactive media as an electron donor. Based on the pilot results, several full-scale two-stage biofilter systems were developed and tested over an additional two years. One of the full-scale systems was designed to provide high levels of wastewater treatment as well as water reuse for landscape irrigation, and this system was installed and monitored over an 18 month period at a single family home in central Florida. Results from the onsite reuse system were very encouraging. Over an 18 month monitoring period, STE total nitrogen (TN) entering the system averaged 50.5 mg N/L, and this was reduced by approximately 96% relative to the applied STE, resulting in an average TN concentration of 1.9 mg N/L prior to water reuse for landscape irrigation. The system was easy to operate and reduced water use at the home. Energy use by the system averaged approximately 1 kwh/day, or 7.8 kwh/1000 gallons treated, and this includes energy for pumping to the treatment areas as well as irrigation of the final effluent. For the home studied, this amounted to approximately $3.00 per month in power costs. Thus, onsite reuse appears to be a viable alternative to traditional OSDS and could provide significant nitrogen removal as well as reclaimed water for irrigation without the need for pipelines and pumping to and from a wastewater treatment plant. This presentation will provide an overview of system design and construction, operation and maintenance, and performance of the experimental onsite reuse system. In addition, groundwater monitoring results before and after system installation will be presented, illustrating the positive impact to groundwater quality from the two-stage nitrogen removal system.

Room 202 August 31st, 2017 2:00:00 PM to 2:30:00 PM

Presenter: Lynne Putnam, Dewberry Consultants, LLC

Presenter Email: calgal15@gmail.com

Title: ENR Upgrades to the Marlay-Taylor 6 MGD WRF

Abstract: The Marlay-Taylor Water Reclamation Facility operated by the Metropolitan Commission (MetCom) of St. Mary's County, MD was required to upgrade to Enhanced Nutrient Removal (ENR) through action of the Maryland Department of the Environment (MDE). A Value Engineering (VE) process conducted by the Dewberry team showed that a 4-stage Bardenpho treatment train utilizing ballasted flocculation would greatly enhance treatment and biomass settling to cost effectively provide ENR level effluent. The subsequent selection of the Evoqua BioMag system along with in situ conversion of two Schreiber SBR units to biological reactors, allowed the reuse of the existing secondary clarifiers which reduced new tankage and eliminated the need for tertiary filters. This VE recommended process was approved by MDE and the upgrades received significant grant funding assistance which saved MetCom large amounts of capital. The resulting overall project cost is $32 million and contains one of the two largest BioMag facilities currently in operation.This presentation focuses on the upgrades constructed and sequencing of the ENR facilities, which include headworks, FOG receiving station, primary and secondary clarifier upgrades, reactor construction and start-up, the new BioMag facility, new blowers and effluent pumps. A part of the upgrade included a new SCADA system, new generators, an additional gravity belt thickener and a new sludge storage building. The improvements upstream and downstream of the BioMag system served several purposes, including removing some BOD prior to the reactors and to accommodate the higher solids loads on the clarifiers and solids handling processes. The presentation will include lessons learned during construction and start-up, the importance of conforming plans and specifications prior to construction start-up, and the need to assume worse case scenarios for construction sequencing.

Room 202 August 31st, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Parimal Bachubhay, Anne Arundel County DPW
Presenter Email: pwbach22@aacounty.org
Title: Benefits of Alternative Construction Methods for Oxidation Ditch No.3 to meet October 2018 deadline for commissioning Patuxent WRF Expansion Project in Anne Arundel County
Abstract: Patuxent Water Reclamation Facility is being is expanded from 7.5 MGD to 11.6 MGD to serve additional development proposed in Crofton/Odenton area. Patuxent Water Reclamation Facility is being expanded to include new headworks facility and new influent pumping station; addition of third oxidation ditch, addition of Secondary Clarifier, addition of three Denitrification Filters; addition of fourth Gravity Sludge Thickener; replacement of existing Ultraviolet Disinfection System; new Effluent Pumps Station; modification to existing Oxidation Ditch aeration system and Chemical Addition System; new medium voltage electrical service; and addition of new control system. Construction notice-to-proceed was issued in October 2016. This project is the second largest wastewater treatment plant construction project for the County with stringent deadline of construction completion within 730 consecutive calendar days. Oxidation Ditch No.3 was originally designed as a cast-in-place reinforced concrete structure with 3.4 MG volume, 326 feet long, 105 feet wide and 17.5 feet deep. A value engineering proposal was requested from Contactor Ullman Schutte/ Dutchland, Inc. to change the design to a precast post-tensioned structure. The purpose of this change was to meet the project deadline and capitalize on several benefits. A detail review of the value engineering and the expected project benefits that will be realized as result of this change in method of construction will be presented in this paper: 1. Time Savings: a)Offsite construction of pre-cast panels at Dutchland, Inc. factory, which releases USC construction crew to complete other project tasks, b)Relatively short duration on site assembly of precast panels. c)Significant time savings are achieved as setting the form work is not required. d) Well-coordinated schedule is expected to provide a net saving of 8 months for construction of Oxidation Ditch No.3 2. Cost Savings: a)Time savings is expected to translate into cost savings (reduction of manpower requirements, reduction of equipment requirements, reduction of batch concrete deliveries, reduction of idle equipment cost, etc.) b)Due to the post-tensioning applied to the pre-cast panels, the thickness of the walls is reduced which provides significant material savings. 3. Minimize Site Impacts: a)Site impact minimization is expected to improve schedule b)The pre-cast post-tensioned structure will reduce the footprint for work area/material and equipment storage/staging area that would otherwise require for construction of cast in place structure. c)Avoid coordination and work conflicts between multiple crews, d)Avoid traffic and noise generated by concrete delivery trucks at the plant and surrounding commercial and industrial district. e)Minimize impact to regularly scheduled chemical deliveries. 4.Quality and Product Technical Characteristics Improvements: a)Maintain controlled environment/quality of concrete work (post-tensioned panels factory build shipped to site), b)Concrete with specified compressive strength is expected (28 day strength to 5,000 psi) due to tightly controlled environment for curing. c)Entire structure is in compression, which minimizes leak potentials.

Room 202 August 31st, 2017 3:00:00 PM to 3:30:00 PM
Presenter: Jason Kerns, HDR
Presenter Email: jkerns@hdrinc.com
Title: Design-build Delivery for large Wastewater Treatment Plant Project leads to Positive Changes for the Chesapeake Bay
Abstract: In 2013, a design-builder submitted an unsolicited proposal to Hopewell Water Renewal (HWR) for the Phase 2 improvements that would reduce effluent total nitrogen discharged into the Chesapeake Bay, and address requests for increased capacity from local industry supporters. The proposal was submitted under the Commonwealth of Virginia's Public-Private Education Facilities and Infrastructure Act (PPEA). The design-builder's unique knowledge of the project needs made the proposal process feasible by allowing design criteria and concept design to be established during the proposal phase. Design criteria and concept design are critical to the acceptance of an unsolicited proposal. Additionally, the design-build approach addressed HWR's concerns by providing a single point of accountability for design and construction, expedited delivery, and budget management. The project included a new 30-feet deep 11-MGD submersible collection system pump station, 3,000-linear-feet of HDPE forcemain to segregate industrial flows, a new 37.2-MGD vertical turbine influent pump station, Moving Bed Biofilm Reactor (MBBR) and Dissolved Air Floatation thickening, two 240-feet long chlorine contact tanks, 30,000-SCFM process air supply system, and new chemical feed supports systems for sodium hydroxide, sodium hypochlorite, and polymer. In addition, the project included the addition of a third fine screen to the existing screening facility and the installation of a new re-aeration unit. For expedited delivery, the project was executed with separate design packages for Site Improvements, Concrete, and Balance of Work to allow concurrent design and construction activities. Monthly Owner-design-builder meetings were held throughout the project to allow for proactive planning and concept discussion. This approach led to a schedule for design, permitting and construction that was completed in 30 months. The design-build approach allowed a large scale project to be delivered effectively and efficiency while working within the budget constraints. The paper will discuss the proposal, Design-build approach, project technical details, and execution.

Room 202 August 31st, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Kristin Waller, PE, OBG
Presenter Email: kristin.waller@obg.com
Title: Don't Settle for Conventional: Emerging Alternative Primary Treatment Technologies
Abstract: Primary clarifiers were some of the first means of wastewater treatment; settling out solids and BOD. Clarifier mechanism technologies have evolved overtime; however, as effluent limitations have become more stringent, and the desire to become more space and energy efficient increases, alternative primary treatment technologies have emerged in response. The use of these alternative primary treatment technologies can increase the amount of primary sludge produced, increasing the feed of valuable methane-producing carbon into anaerobic digestion for higher biogas and energy production, often with reduced footprint requirements. This presentation will review and compare six of these emerging primary treatment technologies. Two case studies, investigating two of these technologies for design and implementation, will also be reviewed. The first case study will review the use of a filtration and settling technology used in a demonstration project to show higher BOD and TSS removal for carbon diversion to increase biogas production in a WWTP's anaerobic digesters. The second case study will review the assessment of high rate screen filters for a new WWTP (2.5 MGD ADF, 7.5 MGD peak). With traditional clarifiers, three primary clarifiers would be required. Since this space was not available, small footprint high rate screen filters, which use a rotating fine-mesh screen to remove solids, were reviewed as an alternative. High rate screen filters were also assessed for their potential to increase the feed of primary sludge to the anaerobic digesters for biogas and energy production to meet the plants "towards net zero" energy goal. These emerging primary treatment technologies report BOD and TSS removals similar -or better- than conventional primary treatment. Many of them also offer significant footprint reduction and lower capital costs, allowing facilities to increase peak flow management and/or carbon diversion as a part of optimizing ENR or as a part of net-zero energy goals, even with space or cost limitations.

Room 202 August 31st, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Phill Yi, Hazen and Sawyer
Presenter Email: pyi@hazenandsawyer.com
Title: Development of Process Models for Planning, Operations, and Training
Abstract: Water resource recovery facilities (WRRFs) both in the United States and other countries are required to achieve ever more stringent limits on nutrients. As such many facilities are implementing online sensor technology, process modeling, and other means to achieve these limits while optimizing processes to minimize the use of resources, energy, and capital. A case study of the Metropolitan Sewer District of Greater Cincinnati (MSDGC) is discussed to illustrate one example of an operations tool (Ops Tool) developed to equip plant personnel with better understanding of the impacts of process changes. MSDGC owns and operates seven major water resource recovery facilities (WRRFs) ranging in size from 1.5 MGD to 130 MGD, with three of the seven plants treating wastewater from combined sewers. MSDGC pursued development of the Ops Tool for six of their facilities to provide several levels of benefit to the staff including what-if scenario operations planning, planning for shutdowns and scheduled maintenance, wet weather operations, plant optimization (energy and chemicals), and training for new staff. The Ops Tools can capture overall plant behavior and provide a larger overview of plant operation and performance based on user input. The current Ops Tools are "off-line" in the sense that data collected must be manually transferred as inputs into the tool for simulation. The Ops Tools bend a stereotypical design process model into a training tool, evaluation of process control strategy evaluation guide, and a platform for integrating sensor data for real-time or "on-line" modeling of a facility. The Ops Tools leverage previous capital investments in process models to create internal tools for process troubleshooting, optimization, and developing standard protocols or process control strategies. Although currently an "off-line" tool, there are opportunities to integrate real-time sensor data to switch to an "on-line" approach. This presentation will focus on the development and calibration of the operations tool for planning and design and some examples uses as a "tool in the toolbox" for operations staff for plant optimization and training. The presentation will also cover feedback from the utility on lessons learned and considerations for implementing an operations tool including internal support and training necessary for maintaining the Ops Tools.

Room 202 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Jimit Modi, Black & Veatch
Presenter Email: modijn@bv.com
Title: Start-up of the Filtrate Treatment Facility
Abstract: Construction of DC Water's Filtrate Treatment Facility (FTF) is scheduled to be substantially complete during the first quarter of 2017, with start-up to follow soon after. The FTF is a side stream treatment system that treats final dewatering belt filter press filtrate using the DEMON® process to remove high ammonia recycle loads. The FTF will remove ammonia more efficiently than treatment in the main liquid process stream as well as preserve capacity in the main liquid process stream. The FTF has a number of features that make it unique: It is the largest DEMON® installation in the world, approximately six times larger than the nearest system.It is the first installation with multiple (six) parallel reactors.It is the first installation using mixer/aerators, as opposed to diffused aeration and submersible mixers. This paper will provide a summary of the performance of the facility during the startup period, including the benefits that DC Water will realize from the facility, along with an overview of the project itself.

Room 202 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Edmund Doku, AECOM
Presenter Email: edmund.doku@aecom.com
Title: Use of Physical Hydraulic Modeling in the Evaluation of Options for Upgrading Reclaimed Final Effluent Pumping Systems

Abstract: DC Water's Blue Plains Advanced Wastewater Treatment Plant (Blue Plains AWTP) in Washington, DC is home to many large scale process systems designed to treat 384 million gallons per day (mgd). The focus of this paper are the pumping systems for the reclaimed final effluent which is the source of water for the process service water used in variety of applications throughout the plant including, seal water for pumps, flushing water for solids handling, washdown water for general housekeeping and dilution for processes such as gravity thickening and carrier water for polymer feed. The pumping systems have experienced operational problems with inlet conditions being the suspected deficiency. Furthermore, because of recent and ongoing upgrades to Blue Plains AWTP, the demand for the process service water is due to increase by 2018. Therefore the reclaimed final effluent pumping systems require upgrading to improve the inlet hydraulic conditions and to increase the capacity. Because of the need to keep plant operations going, shutdowns for any modifications such as structural modifications to the wet well are not feasible. This paper will discuss the options evaluated and how the optimal solution was determined with the help of physical hydraulic modeling. The subject is relevant as many wastewater treatment facilities have pumping systems that require improvements for efficiency, equipment longevity or upgrades due to increased demand while maintaining the plant operations.

Room 202 September 1st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: James O'Shaughnessy, Arcadis
Presenter Email: james.o'shaughnessy@arcadis.com
Title: Physical Modeling for New and Existing Pump Stations

Abstract: The Hydraulic Institute Standards American National Standard for Rotodynamic Pumps for Pump Intake Design (ANSI/HI 9.8-2012) is used to aid in the design of pump intakes and suction piping. This paper will review aspects of the standard and discuss the use of physical model studies on recent projects in the Washington, DC metropolitan area. The standard applies to the design of new intakes as well as the modification of existing intakes. The design objective of the standard is to minimize the excessive presence of the hydraulic phenomena that adversely impact pump performance. The standard provides pump station designers with generalized dimensions and layouts that are proven for various intake types. For deviations in layout and/or pump stations with large capacities, a physical model study of the intake structure and pump suction piping is recommended. For two recent projects, physical modeling has served as an effective tool to develop the basis of design for a new pump intake and the modification of an existing pump intake. For a new 154-mgd stormwater pump station in Fairfax County, VA, the reconfiguration of the wet well in coordination with the results from a physical modeling study resulted in a 35% reduction in the pump station area without impacting hydraulic performance. A physical model study was also conducted for the Filter Influent Pumps (FIPs) at DC Water's Blue Plains Advanced Wastewater Treatment Plant. The existing FIPs have experienced vane-tip cavitation leading to the development of holes in their case iron bowls. Due in part to the increased maintenance caused by this cavitation, DC Water is replacing the FIPs. The physical model study identified poor hydraulic conditions at the pump intakes and recommended remedial improvements to be installed with the new pumps. These improvements will improve the intake conditions for the new pumps resulting in improved performance and reducing future maintenance needs.

Room 202 September 1st, 2017 10:00:00 AM to 10:30:00 AM
Presenter: Dennis Clough, Energy Systems Group
Presenter Email: dclough@energysystemsgroup.com
Title: What is WSSC's mysterious "Project F"?

Abstract: Since 2001, WSSC's Energy Performance Program has successfully reduced the Commission's energy use and costs by leading efforts of engineering audit, design, construction, and monitoring and verification necessary to replace and upgrade energy consuming equipment and systems at all major Commission facilities. The latest and its largest and most far reaching effort, known and "Project F," is a $29M project, currently under construction, that is providing needed infrastructure renewal and process improvements at the Potomac Water Filtration Plant, Parkway Wastewater Treatment Plant, Piscataway Wastewater Treatment Plants. In addition, over 85 buildings, including the Richard G. Hocevar Headquarters, are receiving building system efficiency upgrades. The improvements include: Parkway Wastewater Treatment Plant (High Efficiency Aeration Basin Mixers; Utility Water Pump System Renewal); Piscataway Wastewater Treatment Plant (Aeration System renewal including new high efficiency turboblowers, basin mixers, and supporting electrical switchgear and systems); Potomac Water Filtration Plant (Main Zone Pump #1 Replacement (50 million gallon per day capacity); High Zone Pumps (HZ-7 and HZ-8): LCI Drives replaced with new Variable Frequency Drives (VFDs)); Building Systems Improvements ((85 Buildings including Richard G. Hocevar Headquarters) High Efficiency Lighting Systems (18,500 fixtures), Intelligent Lighting Controls, Mechanical System Improvements, Building Envelope Improvements). This infrastructure renewal project is completely funded from operational cost savings, so it will not create new expenses for WSSC's Customers. In addition, a financial savings guarantee is provided by the project's prime contractor because the project is being delivered as an energy savings performance contract. The Project will reduce WSSC's electricity usage by 12.9 Megawatt-hours annually, thereby reducing carbon dioxide emissions by 8,900 metric tons, which is the equivalent of eliminating 21.1 million miles driven by cars. The presentation will provide an overview of energy performance contracting, the project development process, savings opportunities evaluated and implemented, project status, and lessons learned.

Room 202 September 1st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Teresa DiGenova, Black & Veatch
Presenter Email: digenovatm@bv.com
Title: Assessing the Value of Microgrids for Water and Wastewater Utilities
Abstract: Energy cost is one of the most significant operating costs for a water and wastewater utilities. In addition to energy costs and price volatility, these utilities are increasingly concerned with their energy resiliency, reliability, and sustainability. The implementation of microgrids at appropriate sites can create energy management options for utilities which can address many combinations of these concerns. A microgrid can provide additional resiliency in the wake of catastrophic events that may lead to loss of grid power, and can extend operation during a lengthy blackout. Energy and demand charge reductions and load shifting flexibility can both result in significant cost savings. Integration of renewable energy within a microgrid reduces the utility's carbon footprint and decreases uncertainty when calculating future energy costs. A utility microgrid can be designed to meet and balance multiple drivers. For example, the headquarters of a Midwestern firm is a microgrid which incorporates solar PV, microturbines, batteries and geothermal to produces approximately 1,300 MWh of power per year, 12.5% of its average annual energy demand, increasing both resilience and sustainability. The onsite energy management system ensures that the microgrid provides energy flexibility and security through on-site generation and the ability to island the system from the grid. A similar or expanded system could be implemented at a water or wastewater utility. This presentation will introduce and define microgrids for water and wastewater utilities; discuss key drivers for implementation; describe the components that comprise a microgrid; provide guidance in identifying and selecting the best candidate sites for installing a microgrid; and highlight examples of successful microgrids in the US (and worldwide).

Room 202 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Drew Hood, Keystone Engineering Group, Inc.
Presenter Email: dhood@kegi.net
Title: Upgrading Existing Electrical and Control Systems at Operating Water and Wastewater Treatment Facilities
Abstract: All Wastewater Treatment Facilities face the inevitable decisions of when and how to upgrade their existing electrical and control systems infrastructure. This presentation will focus on how facilities can make informed decisions on when to upgrade, how to select the most appropriate equipment, hardware and software, and how to implement the work while keeping their facilities in operation and compliance. Actual case histories will be presented included a Water Plant in Pennsylvania and several Wastewater facilities owned by Tidewater Utilities. Topics will include, temporary power and controls, operator safety, bypass pumping, utility interconnects, onsite storage and more.

Room 203 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Jim Johnson, Jr., PE, Wallace Montgomery
Presenter Email: jjohnson@wallacemontgomery.com
Title: Ethics - the Heart of the Engineering Profession
Abstract: Over the last 40 years, engineers have experienced dramatic changes in the technology utilized in our profession. However, ethical lapses continue to challenge us. This presentation explores the importance of ethics in the engineering profession by discussing: what does ethics in engineering mean, ethics and the professional continuum, and the code of ethics overlay. It is necessary that engineers based upon professional affiliation, licensure and employment understand the various codes of ethics that come into play while practicing engineering. Violation of these codes have life changing repercussions. Numerous case studies will be discussed that detail the ethical situations engineers have faced and the outcome of their choices. In conclusion, the presentation will provide attendees with several simple, time tested tools that will be helpful in addressing ethical situations that could occur during your career.

Room 203 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Nirav Shah, RK&K
Presenter Email: nshah@rkk.com
Title: Lessons Learned from Flint and Preparing for Anticipated Changes to Lead and Copper Rule (LCR)
Abstract: Exposure to lead is known to present serious health risks to the brain and nervous system of children. According to the Center for Disease Control and Prevention (CDC), no amount of exposure to lead is safe. In 1991, EPA promulgated the Lead and Copper Rule (LCR) – a treatment technique regulation under the Safe Drinking Water Act (SDWA) – to protect public health by minimizing lead and copper levels in drinking water, primarily by reducing water corrosivity through corrosion control treatment. The LCR, revised in 2000 and 2007, requires water systems to conduct tap sampling for lead and copper to determine the actions water systems must take to reduce exposure to lead and copper. The recent crisis in Flint, Michigan, has brought increased attention to the challenge of lead in drinking water systems across the country. Per recent AWWA-sponsored surveys of US community water systems (CWSs), there are approximately 6.1 million Lead Service Line (LSLs) currently present in the United States. Following the Flint Water Crisis, in late-2015, EPA National Drinking Water Advisory Council (NDWAC) produced recommendations to EPA for long term revisions to the LCR. This presentation focuses on various issues surrounding lead in drinking water, including health effects of lead, events and causes of the Flint Water Crisis, overview of the corrosion control treatment, existing LCR, anticipated changes to the LCR, and the LSLs replacement.

Room 203 August 30th, 2017 1:30:00 PM to 2:00:00 PM
Presenter: Danusha Chandy, US EPA
Presenter Email: chandy.danusha@epa.gov
Title: Water Infrastructure Finance and Innovation Act (WIFIA) Program: Find out the Latest Updates
Abstract: With strong industry support, the WIFIA program was enacted as Title V of the Water Resources Reform and Development Act (WRRDA) of 2014 (33 U.S.C. 3901-3914) to provide much anticipated additional Federal loans and loan guarantees for water and wastewater infrastructure projects. In the first selection round, EPA will make available the full $17 million of budget authority appropriated for the WIFIA program to provide credit assistance. This $17 million in Federal funding can help finance total project costs of more than $2 billion. The program's mission is to accelerate investment in our nation's water and wastewater infrastructure by providing long-term, low cost, supplemental credit assistance under customized terms to creditworthy water and wastewater projects of national and regional significance. In this technical session, EPA will provide a programmatic overview, status update, and application guidance to a variety of water and wastewater stakeholders. In addition, audience members will have ample time for a question and answer session with EPA WIFA program staff.

Room 203 August 30th, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Yvette Parker, WSSC
Presenter Email: yvette.parker@wsscwater.com
Title: Program Management of WSSC's 1.6 Billion SSO Consent Decree Program
Abstract: This presentation will focus on the Washington Suburban Sanitary Commission's (WSSC) Consent Decree Program including, navigating through corrective measures taken, challenges faced, compliance achieved, and plans for the future. In December 2005, WSSC entered into a Consent Decree with the U.S. Environmental Protection Agency (EPA), the State of Maryland, and four conservation groups on an action plan to significantly minimize, and eliminate where possible, sanitary sewer overflows (SSOs). The WSSC is among the largest water and wastewater utilities in the nation, serving 1.8 million residents in Prince George's and Montgomery counties, Maryland. The Remedial Measures contained in the Consent Decree are outlined in 13 articles, plus Supplemental Environmental Projects. The 13 articles fall in three phases: Investigations Rehabilitation Assessment The agreement estimates approximately 1.6 billion in improvements to the WSSC's wastewater collection system, provides $4.4 million for additional environmental improvement projects and includes a $1.1 million civil penalty. WSSC oversees the day-to-day operation of their Consent Decree including SSO and spill reporting, review and preparation of submissions, and interaction with Regulators and Stakeholders. WSSC also oversees consultants hired to support specific projects. WSSC was faced with many challenges during the initial stages of implementing the SSO Consent Decree. Within the first 6 months, WSSC was challenged with an aggressive reporting schedule requiring submissions to the regulatory agencies for approval. Submissions and Tasks First 30 Days Sanitary Sewer Evaluation Studies (SSES) schedules Preparing Scopes of Work Preparing Non-SSESs Basin inspection schedules Preparing Closed Circuit Television Exemption (CCTV) list CCTV Condition Assessment of non-SSES basins Preparing GIS maps of grease related SSD's and Building Backups Preparing GIS maps of location of rain gauges and flow monitors First 90 Days Collection System Characterization Report Re-evaluations of SSES that occurred prior to date of entry Initiation and certification of the beginning of the Trunk Sewer Inspection Program Preparation of an Emergency Response Plan to address SSO's and Building Backups First 180 Days SSES re-evaluations Development of a Modified FOG Program Plan Certification that WSSC's Information Management System (MMIS) and GIS were efficient Certification that sewer asset updates and revisions to MMIS and GIS are performed within 120 days Certification of maintenance and update of Pump Station SOP's Development and submittal of a comprehensive Operation and Maintenance Plan Some of the benefits WSSC has gained by overseeing the Consent Decree are central control of all activities and decision making, always knowing the project status, having knowledgeable staff to address business issues, and the constant interaction and trust building with Regulators and Stakeholders. As we plan ahead, the Repair, Replacement, and Rehabilitation of our sewer mains and laterals are being completed on a daily basis, follow up inspections are underway, our Preventative Maintenance and Proactive Maintenance Programs are continuing, and once all the rehabilitation is complete, WSSC will implement Performance Assessments to determine the effectiveness of the work performed in each basin. WSSC plans to continue its efforts and success of managing the Consent Decree.

Room 203 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Spyros Papadimas, Louis Berger
Presenter Email: spapadimas@louisberger.com
Title: Building Constructive Relations with the Regulators: The Baltimore County Case Study
Abstract: Baltimore County entered into a Consent Decree (CD) with the United States Environmental Protection Agency (EPA), the State of Maryland Department of the Environment (MDE) and the United States Department of Justice (DOJ) to take all measures necessary to comply with the Clean Water Act (CWA) and Maryland water pollution control laws, with the goal of eliminating Sanitary Sewer Overflows (SSOs). More specifically, the CD requires Baltimore County to make upgrades to the sewer collection system and pumping stations as well as to enhance the Operations and Maintenance (O&M) of the sewer system. The CD was lodged in 2005 with an estimated value of $900-million over 15 years. Louis Berger was retained by Baltimore County to provide program management services for the implementation of the CD Program. This case study will present the communication and engagement approach employed by the Program Team, during the implementation of the CD Program, to create a productive working relationship and a regulatory coordination success story with EPA, MDE and DOJ. The two key elements of this coordination approach are (1) Proactive Implementation of the CD Requirements, beyond mere execution of the written CD clauses, through engagement of the Regulators in the development of smart adaptive solutions focused on achieving the CD goal of eliminating the SSOs; and (2) Effective Communications utilizing (i) Prompt and Comprehensive Responses and Periodic Reports that include summary tables, photos, maps and supporting documents to thoroughly communicate the message – these responses were acclaimed by the Regulators for their effectiveness; (ii) Consistency and Follow-up Communications through clear and precise responses, without contradictions, and avoiding hasty replies that might be wrong or might create unrealistic expectations - which reinforced the County's credibility with the Regulators; and (iii) Balanced Transparency through openness, business integrity and accountability to satisfy the CD reporting requirements without flooding the Regulators with unnecessary information - which led to focused communications and enhanced engagement between the Regulators and the Program Team. In addition to giving specific examples of the elements of this successful regulatory coordination approach, the presentation will also discuss the Program's Communication Plan and Protocol, the Document and Project Controls and the Data Management tools that were deployed by the Program Team to develop effective communications, foster a high level of trust and create a productive working relationship with the Regulators.

Room 203 August 30th, 2017 3:30:00 PM to 4:00:00 PM
Presenter: Jeremy Hise, Hazen and Sawyer
Presenter Email: jhise@hazenandsawyer.com
Title: Source Trace Analysis – Using a Hydraulic Model to Minimize Treatment Improvement Costs and Identify Low Cost Alternatives to Reduce DBPs
Abstract: Disinfection by-product (DBP) levels including total trihalomethanes (TTHMs) and five haloacetic acids (HAA5s) can vary due to seasonal changes in source water organic content, water treatment plant (WTP) and distribution system operations, seasonal temperature changes, and many other factors. These conditions can lead to moderate to high DBP concentrations in the distribution system. The purpose of this study was to perform an assessment of the current and near-future conditions within the City of Frederick's (City) water distribution system in relation to the Stage 2 DBP Rule and evaluate potential improvements that could be made to better position the City for continued compliance. An evaluation of both treatment process and distribution system operational modifications was performed to improve DBP levels within the City's water distribution system. The City's distribution system hydraulic model (H2OMAP/InfoWater) was used in this study to assess the distribution system. The system demand in the model was adjusted to represent water demands during summer when elevated DBP levels are observed. Flow, pressure, and tank elevation SCADA records from the City's facilities (tanks and booster pumping stations) were used for model calibration. The predicted tank levels in the hydraulic model showed a good match with City's SCADA records. The water age and source influences in the City's distribution system was estimated using the hydraulic model. The source tracing output from the model revealed that one of the sampling site's associated with moderate to high HAA5 levels is influenced by one of the City's WTPs. To mitigate the HAA5 levels at this sampling site, several water treatment process and distribution system management alternatives have been evaluated. Switching the pre-oxidant from chlorine to either chlorine dioxide or potassium permanganate was recommended at this WTP to reduce the formation of HAA5. Moderate to high TTHM levels at select sampling sites were associated with another WTP operated by the City and some water supplied by the County. While switching to alternate coagulants or implementing granular activated carbon treatment at the WTP are effective for removing DBP precursors, they are associated with considerable capital costs. Moreover, these strategies may not yield intended results due to blending with the County's water. Thus, cost effective alternatives were investigated for reducing the DBP levels in the distribution system. TTHM concentrations versus water age were investigated in the distribution system. Strong correlations ($R2 \geq 0.89$) were found for the THM formation versus water age. Flushing, pipe looping, removal of tanks from operation, and optimization of tank operations were considered as options to reduce water age in the system. Hydraulic modeling determined that these strategies would have minimal impact on decreasing water age. Hydraulic modeling of the distribution system discovered that sample locations with high TTHM concentrations could be traced to two storage tanks in the distribution system. Aeration could reduce TTHM concentrations in these tanks by over 40%, and thus, aeration was recommended for the City to implement. Lowering TTHM levels further in the distribution system would provide the City flexibility to compensate for seasonal variation and extreme weather events.

Room 203 August 30th, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Dennis Funk, Gannett Fleming, Inc.
Presenter Email: DFUNK@GFNET.COM
Title: Proactive Outreach as an Element of a Successful Master Plan Implementation

Abstract: The Clinton Water Pressure Zone (HG385B) serves a large and growing area of southern Prince George's County, MD. The zone currently includes a single 3.0 million gallon (MG) water storage facility. The Washington Suburban Sanitary Commission (WSSC) retained the services of Gannett Fleming (GF) to perform a comprehensive hydraulic study of the pressure zone and make recommendations on additional infrastructure based on the results. To assist in performing the study, WSSC provided the skeletonized WaterGEMS computer model that included the majority of the existing primary water mains (12-inch and greater) and facilities throughout the study area. GF updated the water model to reflect all primary water mains and planned improvements within the study area as well as updated study area demands to reflect 2010 conditions. Additional analysis included the determination of the existing and projected water use through 2040 within the study area to evaluate storage needs in the 385B and 280A Pressure Zones; evaluate transmission main improvements required to serve future demands and improve service reliability/redundancy throughout the entire study area and to allow existing tanks to meet their design intent; and evaluate pressure zone boundaries and determine whether new pressure reducing valves and/or modifications to existing zone boundaries were required. This analysis recommended the addition of 4 MG of elevated water storage and three transmission mains be added to WSSC's Capital Improvement Program. The study proposed two new 2 MG elevated storage water tanks to distribute storage in the Zone and to allow phasing of the construction. The study evaluated numerous possible site for the two new tanks. The top 15 sites were identified and presented to stake holders to solicit their feedback as far as the suitability of the sites. The site selection then included gathering GIS data, field data, conducting community outreach, as well as having discussions with the property owners themselves. Currently, one of the parcels has been purchased and the elevated storage tank is under design. The second parcel for the future tank is in the process of being acquired. Additionally, the study identified the need for three new transmission mains (28,000 feet of 30" main; 24,000 feet of 24" main; 4,000 feet of 16" main) to improve water movement within the Clinton Zone and also to reinforce the connections to two adjacent pressure zones. All three of these transmission mains are currently being designed. This presentation will discuss the master plan evaluations and development of recommendations. The presentation will also review the subsequent tank site investigations and will outline the decision making process in the ultimate site recommendations. The critical coordination with the stakeholders, both planning and regulatory agencies, will be discussed. Extensive community outreach activities were a critical element of the site evaluation to ensure that these projects were set up for success from the start.

Room 203 August 30th, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Kevin Laptos, Black & Veatch
Presenter Email: laptoskt@bv.com
Title: Master Planning Priorities: Getting Your Existing System in Order While Preparing for Growth

Abstract: Historically, water system master plans have primarily been driven by population growth and the need for additional system capacity. While growth is still a significant driver for master planning, additional factors have emerged in more recent years which have changed our approach to system planning. Now, utilities must also comply with water quality regulations, address aging infrastructure, reduce operating costs, and maintain or increase service reliability and resiliency. These additional challenges have caused us to change our approach to system master planning. Another factor that has become more evident in recent years for utilities across the US is the trend in declining usage which is primarily due to the past and ongoing installation of water conserving fixtures and appliances, along with some other factors. Even with continued growth, the declining usage rate trend has effectively allowed some utilities to defer some capacity-driven system improvements. However, this trend has also brought with it some challenges for utilities including reductions in revenues and shifts in water usage across systems which have changed the way utilities must operate, design, and plan their systems. Hydraulic models have been available for many years to help us with evaluating and planning for system capacity. Modeling software has improved greatly over the years and is now being used to help us evaluate water quality, operating costs, and system reliability. Additionally, new software tools are being developed to help us adaptively manage master plan capital improvement plans (CIPs). Our presentation will discuss the factors, trends, and challenges mentioned above and present case studies in how Charlotte Water, NC and Greenville Water, SC are using modeling and CIP tools to address these issues in their water system master plan and will provide attendees with insights and ideas on how to analyze their systems.

Room 203 August 31st, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Sebastian Smoot, HDR
Presenter Email: engineer.smoot@gmail.com
Title: Impacts of Phosphorus Management Tool and Emerging Phosphorus Recovery Technologies on Biosolids Land Application

Abstract: Water resource recovery facilities (WRRFs) are increasingly challenged to find suitable outlets for land application of biosolids due to environmental regulations in many states across the US. In order to adapt to these new regulations, utilities may have to significantly revise their biosolids management plans, either by implementing advanced biosolids processing technologies or finding new markets and outlets for their end product. Land application of organic amendments in Maryland is subject to the University of Maryland Phosphorus Management Tool (UM-PMT), which is intended to reduce phosphorus runoff into the Chesapeake Bay. The UM-PMT presents a significant restriction on the viability of land-application throughout Maryland. In order to maintain reliable and cost-effective biosolids management programs, utilities are considering adapting their operations and processes to mitigate the impact of these regulations. Some utilities in Maryland are considering reducing their exposure to land application restrictions by finding new outlets for their end product and/or installing thermal dryers. Another potential strategy for utilities to reduce their exposure to land application restrictions is to implement a phosphorus recovery technology (PRT). PRTs could benefit WRRFs burdened by UM-PMT and similar restrictions because they can remove 10-30% of the P content in biosolids, which would allow higher loading rates for sites subject to phosphorus regulations. Depending on site and biosolids characteristics, a 25% reduction in biosolids P content could shift the economics enough to encourage biosolids land application on sites that were previously off-limits due to UM-PMT restrictions. This outcome, in addition to other benefits, including formation of a valuable byproduct, reduction of undesirable struvite formation, decreased nutrient loads in the plant recycles, and lower chemical demands for P removal, could result in more utilities considering implementing PRTs at their WRRFs.

Room 203 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Matthew Van Horne, Hazen and Sawyer
Presenter Email: mvanhorne@hazenandsawyer.com
Title: “Looking Forward” - Maximizing the Value of Biogas Through Consideration of Alternative Uses

Abstract: Biogas produced from anaerobic digestion has long been used for power generation and process heating. However, new biogas utilization technologies and evolving renewable energy markets (i.e. RINs, RECs, Low Carbon Fuels, etc..) are opening up new alternatives to conventional biogas utilization methods. This technology growth combined with uncertain future energy markets/regulations has significantly widened the range of economic outcomes and the long term feasibility for all biogas utilization technologies. Accounting for this range of future conditions can be a significant challenge for wastewater utilities when evaluating long term biogas utilization strategies. Failure to account for the full range of future plant, regulatory, and market conditions can result in inaccurate assessments of long term benefits and risks. Beyond the technical considerations for the various utilization approaches, there are a significant number of market and regulatory conditions that must be considered for each utilization alternative. To capture the full range of long term outcomes, an Energy Balance and Analysis Tool (EBAT) has been developed. EBAT models the energy projection benefit for a wide range utilization technologies under multiple long term future conditions including high and low market conditions, high and low plant growth, and impacts from co-digestion. The purpose of this presentation is to demonstrate how the EBAT model is used to model the range of project future market and plant conditions and how the results enable wastewater utilities to make more informed decisions on their long term biogas utilization strategies. This presentation will review some of the currently available biogas utilization approaches and identify some of the key economic and non-economic considerations for each approach. Additionally, multiple case studies will be presented to demonstrate the value of the EBAT tool in different applications that have helped utilities of various sizes determine the highest value digester gas utilization approach.

Room 203 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Jeremy Holland, HDR
Presenter Email: jeremy.holland@hdrinc.com
Title: Municipal Infrastructure and Renewable Energy: A National Perspective
Abstract: There is significant interest in reducing environmental impacts of wastewater treatment and recognizing the opportunities to reframe thinking of a wastewater treatment facility as a resource recovery facility. Water reuse and nutrient recovery have been focal points of this effort, but more recent opportunities have arisen that make anaerobic digestion and biogas use another attractive opportunity to improve the environmental footprint of wastewater facilities and increase the resources recovered from our municipal waste stream. Biogas provides an opportunity to generate renewable heat, electricity, transportation fuel, and even bioplastics. These opportunities can reduce the environmental cost of heat, power, or fuel from fossil fuel sources. And incentives are now available that will also provide significant revenue sources for communities to reduce operating costs and assist in capital projects. In addition to these onsite opportunities, many communities are recognizing the unsustainability of landfilling organics, and seeking ways to divert those organics. Wastewater facilities with existing digesters may have capacity to receive and process these organics, resulting in lower fugitive emissions at landfills and increased renewable fuels generated at the treatment plants. Fats, oils, and greases are also a maintenance challenge for collection systems. Grease trap programs that direct those wastes to treatment plants provide the benefit of reduced impacts due to overflows caused by blockage along with added organic feedstock to digesters for enhanced biogas production. This presentation will discuss the opportunities and challenges of implementing organics recovery and co-digestion to increase biogas production, along with the opportunities for use of the biogas to reduce energy consumption, greenhouse gas emissions, and transportation fuel usage. Some case studies of facilities that have implemented programs will be described and presented as well.

Room 203 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Chris Moline, HDR
Presenter Email: christopher.moline@hdrinc.com
Title: Centralized Biosolids Processing with Thermal Hydrolysis and Anaerobic Digestion: Lab-Scale Testing and Process Modeling
Abstract: The Washington Suburban Sanitary Commission (WSSC) will be implementing a centralized thermal hydrolysis process (THP) and anaerobic digestion (AD) at the Piscataway WWTP. The new facility will receive and process dewatered cake from all five WSSC WWTPs, while the current Class B lime stabilization processes at all WWTPs will be eliminated. There are numerous benefits of processing wastewater solids with THP/AD, including higher anaerobic digester loading rates, improved volatile solids reduction (VSR) and digester gas production, higher dewatered cake solids, and production of a low-odor Class A biosolids product. However THP/AD is not without its challenges, particularly due to the nutrient levels in the dewatering recycle stream. AD releases nitrogen and phosphorus, and THP contributes to soluble organic nitrogen and phosphorus which can be difficult to remove in the liquid treatment process. Additionally, more than two-thirds of the solids to be processed at Piscataway WWTP are waste activated sludge from other WSSC plants, which will contribute to the nutrient recycle. Piscataway WWTP must continue to meet effluent TN and TP limits of 4 mg/L and 0.18 mg/L, respectively, while processing solids from all WSSC WWTPs. A lab-scale THP/AD study and BioWin process model were used to evaluate the impact of new solids handling operations on the liquid treatment process at Piscataway WWTP. The lab-scale study was also used to evaluate performance of THP/AD in terms of volatile solids reduction, dewatered cake solids, and digester gas composition. Results from the lab-scale study were applied in the overall BioWin model for Piscataway WWTP. The model was used to evaluate plant performance at future flows and loads, test operational approaches, and estimate chemical demands. Findings of the lab-scale study and BioWin modeling will be presented. The information will be relevant for utilities considering anaerobic digestion, thermal hydrolysis, or centralized solids treatment operations. The findings will be particularly useful for utilities in the Chesapeake Bay region where low effluent nitrogen and phosphorus limits must be met. Results from the lab-sale THP/AD study indicate typical levels of ammonia and soluble reactive phosphorus in the dewatering recycle stream. Dissolved organic nitrogen and soluble non-reactive phosphorus concentrations are slightly higher than expected, and treatability studies are being conducted to estimate the quantity that could pass through the WWTP. Preliminary results indicate that THP/AD could increase effluent TN by as much as 1 mg/L and TP by 0.1 mg/L. Lab-scale results also indicate lower than expected VSR and cake solids, which may be attributed to the WAS and alum content of the solids. Additional testing is underway to evaluate the impact of THP temperature on dissolved organic nitrogen and dewaterability. Based on predicted nutrient loads, BioWin modeling indicates that effluent nitrogen limits can be met with sidestream anammox treatment, additional methanol dosing, and specific adjustments to the step-feed activated sludge process. Effluent phosphorus limits will be met by dosing additional alum for chemical precipitation.

Room 203 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Wayne McFarland, GHD Inc.
Presenter Email: wayne.mcfarland@ghd.com
Title: Codigestion with Food Wastes and FOG
Abstract: Many wastewater treatment plants with anaerobic digesters are interested in increasing biogas yields (and tipping revenues) by accepting food wastes and fats, oils & grease (FOG). This presentation provides an overview of available feedstocks, potential improvements in biogas yields, and operational challenges associated with accepting these wastes. Characteristics of food waste vary significantly, and can have wide ranges of biogas production, depending on unit energy content. Graphical comparisons of the unit energy values for various feedstocks is included to reinforce the need for careful consideration of feeding rates to avoid digester upsets. Unit energy content can also be used to predict the potential increase in biogas production, associated with addition of food wastes. Similarly, a discussion of the different types of FOG (saturated and unsaturated) are presented, since they have various effects on biogas production and digester efficiency. Food waste and FOG pretreatment methods are presented, including processes of grinding, dilution, and mixing. Case studies are included for several plants which have had successful codigestion programs in North America and Europe.

Room 203 August 31st, 2017 11:30:00 AM to 12:00:00 PM
Presenter: Josh Mah, Virginia Tech
Presenter Email: jmah@vt.edu
Title: The Microbial Community Dynamics of Thermal Hydrolysis Digesters
Abstract: The goal of this project is to provide an understanding of the differences between microbial community structures in anaerobic digesters fed with thermally pretreated ("hydrolyzed") municipal sludge and conventional digesters fed with non-pretreated sludge. Microbial communities in anaerobic digesters can be defined as complex metabolic relationships between populations (individual species) of microorganisms, each of which may play a highly specialized and/or symbiotic role in the overall metabolism of sludge to biogas. The observed performance of a given digester is directly attributable to the structure of the microbial community (or dysfunction thereof) and its collective fit to the environmental conditions of the digester such as the substrate type, loading rate, temperature and pH. The structure of the community is in turn governed by both the metabolic characteristics of the individual populations and the manner in which the anaerobic digestion process is operated. Thermal hydrolysis pretreatment (THP) of digester feed sludge may play an additional key role in the structure of digester microbial communities because THP heat the sludge to at least 160C, which completely sterilizes the feed sludge and therefore creates a closed microbial community (in the most common THP process configuration). Without continuous inoculation of microbial diversity, the roles of competition, selection and extinction may have significantly stronger influences in the structures of microbial communities in THP digesters as compared to conventional systems. This project aims to provide a better understanding of the microbial communities of THP digesters and the opportunities and/or vulnerabilities they may present. This study collected nearly a year worth of time-series samples from four full-scale mesophilic digesters fed with thermally hydrolyzed feed sludge. In addition, samples were collected from more than a dozen other digesters (mesophilic, thermophilic, acid-gas phased, and temperature staged) for comparison. The bacterial and archaeal communities were characterized using “next generation” genomic community profiling techniques (30 million raw DNA sequences using Illumina MiSeq V4 250bp PE sequencing). Results have been analyzed at the phylum (L2) and genus (L6) levels. Generally speaking, the microbial diversity (eg. richness) of thermal hydrolysis digesters is half that of comparable non-thermally hydrolyzed digesters and the diversity is highly uneven.

Room 203 August 31st, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Terry Goss, AECOM
Presenter Email: terry.goss@aecom.com
Title: Struvite, Turning a Potential Maintenance Problem into an Opportunity
Abstract: A common problem in current wastewater treatment plants is magnesium ammonium phosphate (MgNH4PO4(s)) precipitation, also known as struvite, which can foul piping and equipment. Struvite typically forms in plants that contain anaerobic digesters with upstream biological phosphorous removal. Struvite precipitation occurs when the release of orthophosphate and ammonia from cell hydrolysis during anaerobic digestion reacts with magnesium ions at pH conditions conducive for struvite formation (pH of 7.5 to 10). Struvite accumulation occurs at locations where pressure is low and CO2 is released from solution thus increasing the pH. Unwanted struvite fouling has traditionally been solved by manual cleaning, dilution, dosing an iron salt to precipitate the phosphorous or using an anti-scalent to lower the pH. A new area of interest is to control the mechanism of struvite formation and turn what was previously a nuisance into a beneficial slow release phosphorous based fertilizer which follows the growing trend in the industry to change the image of wastewater treatment plants and convert them to resource recovery plants. Several technology providers offer processes for controlled struvite precipitation which generally require the addition of magnesium chloride since magnesium is typically the limiting reagent in struvite formation. Traditionally controlled struvite precipitation has been applied to the dewatering sidestream before being recycled back upstream to the primary or secondary treatment step. Ostara® and Multiform Harvest® are two of many companies that offer systems for this type of configuration using a proprietary fluid bed reactor designs to control struvite formation and generate a fertilizer product to the desired size and characteristics. An alternative configuration was developed more recently (offered by CNP as Airprex® and Schwing) applies the struvite precipitation to the digested sludge instead of the dewatering sidestream. Applying a struvite precipitation process between the digestion and dewatering step has the potential to offer two major benefits. The first benefit is that it removes struvite prior to dewatering eliminating the potential maintenance issues. The second benefit is that removing the soluble orthophosphate from the sludge (up to 95% removal) improves the dewaterability of sludge allowing for a 2-4 percentage point increase in cake solids. The purpose of this paper is to provide an overview of the industry status regarding struvite management and struvite precipitation technologies. The paper will also present results from a recent pilot study showing the potential improvement in dewaterability from applying a struvite precipitation technology on anaerobically digested biosolids prior to dewatering.

Room 203 August 31st, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Jeffrey Culton, PE, Buchart Horn, Inc
Presenter Email: jculton@bucharthorn.com
Title: Heat Recovery from Biosolids Dryer Significantly Reduces Operating Costs at LASA Wastewater Treatment Facility
Abstract: The Lancaster Area Sewer Authority (LASA) proactively began a biosolids upgrade and improvement project anticipating tighter regulations on biosolids. These upgrades are currently under construction and include two new anaerobic digesters, a new centrifuge, and a new biosolids dryer. Biosolids drying systems are becoming more popular due to their ability to create a Class A biosolids while reducing the biosolids volume and disposal cost by 400%. The one drawback of a biosolids drying system is the cost of fuel for the dryer. In a typical wastewater treatment facility the gas produced by the anaerobic digesters is used as a fuel source to heat the digesters. Excess gas not needed to heat the digesters is flared off to the atmosphere. In most facilities using biosolids dryers, this excess gas is used as a fuel source to heat the dryer. However, the amount of excess digester gas available typically falls considerably short of the amount of gas required to fuel the dryers, making it necessary to use an auxiliary fuel supply such as natural gas, propane, or fuel oil at a considerable expense. At the LASA facility, fuel oil was selected as the auxiliary fuel source due to the unavailability of natural gas at the site. Due to the high cost of fuel oil it was critical to find a way to reduce the amount of this auxiliary fuel required for the dryer. The biosolids drying process produces a large amount of high temperature off gases from the dryer's evaporation process that are normally vented to the atmosphere after the gases are cooled and odors are removed. Recently, the dryer manufacturers have come up with methods of recovering the large amounts of heat from these off gases, which can then be used to heat the anaerobic digester. Therefore, it is no longer necessary to use the digester gas to fuel the digester boilers, thereby making all of the digester gas being produced available as fuel for the dryer. This dryer heat recovery significantly reduces the amount of auxiliary fuel required, which provides a corresponding significant reduction in operating costs. The use of a dryer heat recovery system makes biosolids drying a much more attractive option for the final treatment of biosolids.

Room 203 August 31st, 2017 3:00:00 PM to 3:30:00 PM
Presenter: Lisa Boudeman, Material Matters, Inc.
Presenter Email: lboudeman@materialmatters.com
Title: Not All Dryer Products are Created Equal
Abstract: Thermal drying is an accepted wastewater industry process for generating a biosolids product that meets the Class A standards for both pathogen reduction (PR) and vector attraction reduction (VAR). Utilities and engineers alike typically consider biosolids drying as a processing technology that will generate a high quality, marketable product. Therefore, utilities commonly consider biosolids drying as a solids handling option when planning for solids handling upgrades and/or developing long-term biosolids master planning projects. While the wastewater treatment industry typically groups all biosolids drying technologies together into one category for PR and VAR compliance, not all biosolids drying technologies and dried products are created equal. In fact, each of the dozens of dryer technologies operate under distinctive operating conditions (temperature, heating method, screening, recycle flows, etc.), which greatly influences the characteristics of the dried biosolids product. Further, upstream solids handling processes (i.e. type and level of digestion, screening, influent characteristics, polymer use, and hauled waste acceptance) strongly influence the dried biosolids characteristics. In turn, there are hundreds, if not thousands, of unique biosolids products (with varying shape, size, hardness, odor profile, and dustiness) that a “single” biosolids dryer technology can generate (refer to Figure 1). Unfortunately, many thermally dried biosolids products are not desirable or marketable in beneficial use markets. In fact, a dried product can be just as costly to manage as Class B or unclassified biosolids products. Therefore, it is critical for utilities to understand that installing a biosolids dryer is not an end all solution to developing a sustainable biosolids management program. Instead, the utility must understand the dryer technology that will be installed, as well as the corresponding product that will be generated. Furthermore, a utility must recognize that in some cases, biosolids-drying technology is not a suitable processing technology to meet their economic and beneficial use goals. This paper will discuss various case studies in which utilities selected biosolids dryers either with or without consideration of the characteristics of the product to be generated. The influence of upstream processing on the dryer operations and the characteristics of the dried product will be presented, and dried product samples from around the United States will be shown for comparison. Finally, the paper will introduce readers to the systematic process for selecting a dryer that will meet a utility’s short-term and long-term goals.

Room 203 August 31st, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Engin Guven, Black & Veatch
Presenter Email: guven.engin@gmail.com
Title: Ensuring Success for a State-of-the-Art Biosolids Treatment System at the Neuse River Resource Recovery Facility
Abstract: City of Raleigh Public Utilities Department owns and operates Neuse River Resource Recovery Facility (NRRRF) which is an advanced wastewater treatment facility with liquid treatment capacity undergoing expansion from 60 mgd to 75 mgd. Biosolids are currently processed through aerobic digestion to produce Class B liquid or through lime stabilization to produce Class A cake. Raw solids are also sent for offsite composting by a third party or landfilled. Under the Bioenergy Recovery Program, the City will be transitioning to anaerobic digestion with thermal hydrolysis pre-treatment (THP) to produce all Class A biosolids and gas utilization through vehicle fuel and while moving toward energy neutrality. The proposed improvements will replace much of the existing solids processing facilities at NRRRF with new processes, some of which are unfamiliar to plant operations and maintenance staff. With such a significant transformation and change in biosolids treatment, it will be essential to develop a detailed plan for integrating O&M perspectives into the design, construction, start-up, and routine operations phases of the project. This will be accomplished through an integrated HAZOP/MOPO/Constructability program focused on constructability, operations, maintenance and hazards planning. The program will include a number of structured workshops and development of a detailed Maintenance of Plan Operations (MOPO), commissioning and startup plans. This will include the engineers, utility engineering, operations and maintenance staff and the CMAR staff. Multi-day HAZOPs, MOPO, and constructability workshops will be conducted between 30 and 60% design level in order to identify potential hazards and operability problems in the system at the process level so the designers can incorporate necessary changes to the final design. The MOPO plan will define general sequence of events during construction and commissioning, identify major tie-ins to the existing systems at NRRRF, confirm plant readiness; identify where mitigation plans process specific MOPOs may be needed, identify solids management strategy for construction and start-up duration including staffing needs as a whole, and define communication requirements to project stakeholders. The lessons learned from the integrated HAZOP/MOPO/Constructability workshops and discussions from developing the MOPO plan will be presented in this paper for the utilities considering implementing a major biosolids upgrade at their facility.

Room 203 August 31st, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Miguel E Miranda, DC Water
Presenter Email: miguel.miranda@dcwater.com
Title: Belt Filter Press Optimization Study at DC Water
Abstract: It has been over two years since the Dewatering Facility with Belt Filter Presses (BFPs) was commissioned at the Blue Plains Advanced Waste Water Treatment Plant. The feed to BFPs consist of solids that has been treated with Thermal Hydrolysis Process (THP) and Anaerobic Digesters. The BFPs have been able to consistently produce cake with 28-32 %TS with low odor. Three parameters were chosen for this optimization study; polymer dose, belt speed, and floc tank mixing speed. Polymer dose was chosen because of its strong correlation with cake dryness. Belt speed was chosen to measure its relationship to cake thickness. If the layer of cake being squeezed between two belts is too thick, the water pockets in the middle of the cake may not be released. However, if this layer was too thin the belts may not be able to compress the sludge enough to achieve proper dewatering. Not choosing the proper belt speed in relation to the solids loading rate can also cause uneven distribution on the belts, which can lead to premature belt failure from misalignment or wrinkling. Floc mixing speed was chosen because of its potential effect on the polymer and sludge interaction. Insufficient mixing of sludge and polymer can lead to belt blinding or uneven belt loading. However, overmixing may increase the polymer demand by shearing the polymer chains. This study was of interest to DC Water because consistently achieving 1% dryer cake leads to saving approximately $260,000 each year in hauling cost. To best optimize the BFP operations, performance trials consisted of testing each parameter over a wide range while keeping other variables constant. The study showed that the most impactful parameters to BFP performance were polymer dose and belt speed. Floc mixing speed saw little impact on belt performance at the mixing speed range. An efficient polymer dose, the area before the %TS began to plateau, was found to be between 18-20 lbs/dton. If the dosage was too low, the belt would begin to spill from the sides. However higher dosage did not necessarily lead to higher solids concentration. The optimum belt speed was when the resulting cake thickness is 9.5-12.5mm. The cake %TS was lower when the cake thickness was below or above this range. DC Water plans to perform additional studies in the near future to gain a better understanding of dewatering THP pre-treated solids.

Room 203 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Yong Kim, UGSI Solutions, Inc.
Presenter Email: ykim@ugsicorp.com
Title: Technical Study on Improving Polymer Efficiency for Sludge Dewatering: Case Studies at Water and Wastewater Treatment Plants
Abstract: Achieving effective polymer solution has become more important than ever because polymer cost is frequently the third largest operating expense at many wastewater treatment plants. A well-designed polymer system is the key for achieving superior performance and cost-effective sludge dewatering. This paper illustrates how to maximize the polymer value based on the basics in polymer science and fluid dynamics. Effect of Dilution Water: The quality of dilution water has a serious impact on polymer activation. Hardness representing a major portion of ionic strength in water plays an important role. With the increasing trend of utilizing treated effluent from wastewater plant for polymer mixing, it is critical to understand the effect of residual chlorine on the quality of polymer solution due to the oxidative attack on the carbon-carbon bonds of polymer. Effect of Mixing: As soon as polymer contacts water, a film of concentrated solution of polymer is built up around individual polymer particles, and they quickly form agglomerates (fisheyes). Once fisheyes are formed, water can penetrate them very slowly and total dissolution time becomes much longer. Results of various laboratory testing are presented regarding the effect of different mixing schemes: single-stage or multi-stage mixing, high-shear or low-shear mixing, and effect of mixing time. Water Treatment Plant: It is proven that the concept of two stage mixing is important in polymer mixing: very high energy mixing during initial wetting stage and then low energy mixing to prevent polymer molecules from being damaged. Benefit of two-stage mixing is shown with supporting lab data and a trial at a water treatment plant in Philadelphia area. Two mixing chambers were evaluated in dewatering alum-carbon sludge with belt filter presses. It was striking to observe that one mixing chamber performed 30% better than the other. Wastewater Treatment Plant: Non-uniform mixing energy distribution in a mixing tank is detrimental to polymer solution because a considerable amount of polymer chains are broken during extended mixing. It is known that mixing intensity distribution is related to the ratio of impeller to tank diameter: a longer impeller generates more uniform mixing intensity. Dry polymer system developed based on this principle was trialed at a wastewater treatment plant near San Francisco. The trial polymer system resulted in 25% improvement in polymer efficiency.

Room 203 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Samuel Grant, Gannett Fleming, Inc.
Presenter Email: 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.

Room 203 September 1st, 2017 10:00:00 AM to 10:30:00 AM
Presenter: Reed Palmer, Hazen and Sawyer
Presenter Email: rpalmer@hazenandsawyer.com
Title: How Bad Will It Get? When Should You Cut back? Using Water Supply Forecasts and Water Shortage Triggers to Manage Droughts
Abstract: The City of Raleigh, NC is one of the fastest growing cities in the US, and like many growing cities in the southeast, is located in a region subject to increasing water scarcity. This presentation describes the evolution of Raleigh's drought preparedness over the last decade. Following the 2007-08 drought, the NC legislature passed a statute requiring each utility to prepare and submit a Water Shortage Response Plan (WSRP). The law stipulates that each utility's WSRP be set up with several stages of increasingly stringent conservation requirements with quantifiable triggers defining the conditions for implementation. Concurrent to these events, the NC Division of Water Resources (DWR) developed sophisticated water basin models that provide stakeholders like Raleigh with new planning and forecasting tools. When the City's WSRP was put into practice over 3 consecutive dry years from 2010-2012 it became evident that the conservation triggers in the WSRP were sub-optimal. The short-term solution was to generate a water supply forecast with DWR's basin model that better informed the decision to enact mandatory conservation measures. The forecasts estimate the probability of being below a target reservoir level at key future dates and were also used to reduce the probability of shortage by optimizing the proportion of demand to withdraw from the City's two reservoir systems. The longer-term solution was to improve the drought triggers in the WSRP. Effective drought response triggers facilitate a utility's ability to manage emerging droughts promptly while simultaneously minimizing false alerts. False alerts (mandating conservation when unnecessary) aggravate customers, erode conservation compliance during future droughts, and disrupt the utility's revenue stream. Creating effective triggering mechanisms for a WSRP requires two important types of information. The first is a detailed understanding of the water supply system and, in particular, the dynamics that distinguish normal hydrologic cycles from droughts. The second is an estimate of expected water use reduction at each WSRP stage so the WSRP's ability to manage shortages can be accurately modeled. Estimates of water use reduction by drought stage were developed with data on reductions achieved during prior droughts coupled with additional demand sector study. Using an iterative process with the basin models, a new set of triggers was developed that are expected to reduce the frequency of WSRP activation by 40-50% without increasing the risk of exhausting the City's water supply during the worst droughts on record.

Room 203 September 1st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Ben Wright, Hazen and Sawyer
Presenter Email: bwright@hazenandsawyer.com
Title: Groundwater Depletion: Alternative water supply options for the coastal Mid-Atlantic
Abstract: Communities along much of the Mid-Atlantic coast rely on the coastal plain aquifer system for water supplies because surface water resources in the region can be limited or have marginal water quality. Over the last 10 to 20 years, utilities have had to drill deeper and deeper wells to access new supplies of water as populations and demands have increased. However, many communities in New Jersey, Maryland and Virginia have tapped the deepest aquifers and are still experiencing substantial aquifer drawdown. Therefore, some areas of the region are reaching the sustainable extent of the groundwater resources and are pursuing comprehensive water supply planning studies to identify alternate sources of supply. Supply options include surface water, conservation, desalination, and wastewater reuse, as well as regionalization, to diversify available supplies. Each of these alternatives has its unique challenges including high cost, treatability, technical feasibility, political hurdles, and public acceptance. Alternately, investment in these supply options can result in new opportunities, such as the ability to sell water to adjacent communities, nutrient reduction from wastewater reuse, and improved resilience to supply disruptions.This presentation will provide a number of case studies to illustrate the supply planning process and outcomes pursued by utilities currently addressing the challenge of diminishing groundwater supplies. Further, we will provide a triple bottom line framework that we've used to enable utilities to compare the full range of economic, environmental, and social considerations when pursuing alternative water resource plans. This presentation will be directly relevant to many utilities in the Mid-Atlantic coastal plain region who are facing similar water supply challenges from groundwater depletion.

Room 203 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Elford Jackson, RK&K
Presenter Email: ejackson@rkk.com
Title: Environmental Sustainability for a Cultural History
Abstract: The National Museum of African American History and Culture (NMAAHC) site, a 5.36-acre parcel is part of the Washington Monument Grounds. Occupying the last available space on the National Mall, the Smithsonian's National Museum of African American History and Culture will be situated prominently among the nation's White House, the Washington Monument, the National Mall, the National Museum of American History (NMAH), and the Department of Commerce Building. The proposed building includes a large footprint with several floors below grade and a smaller footprint above grade (the corona). The total area of the new building is approximately 322,648 S.F. and the total site coverage is 23%. The FEMA FIRM map for Washington DC, indicated that a portion of the site is within the 100 year and 500 year floodplain. The primary receiving watercourse in the vicinity of the project area is the Tidal Basin of the Potomac River which is fed from a storm drain collector sewer in Constitution Avenue. There were several site constraints that were considered in the stormwater management plan. These site constraints include soils with poor infiltration capability; history of significant flooding; high groundwater; conflicts with proposed and existing utility services; site aesthetic requirements established by regulatory agencies; and limited space for an at grade open SWM facility. Hydrologic computations were completed for the existing and proposed conditions to comply with the District of Columbia's Storm Water Management Regulations and the Energy Independence and Security Act (EISA). The EISA storm event is defined as the 95% rainfall event based on a 30 year observation period. The 95% rainfall event depth is equal to the 24 hour rainfall amount in inches which is greater than or equal to 95% of all rainfall events over the 30 year observation period. Due to the aforementioned site constraints, the design intent was to control storm runoff under the proposed conditions to the Maximum Extent Technically Feasible (METF). The proposed stormwater strategy focused on sustainability and water reuse. The design elements used to meet the regulatory requirements along with the design intent included, a cistern, green roof, stormwater detention vault, a water quality structure, and soil remediation. The cistern was designed to perform two main functions; store non-potable water and perform as a reserve capacity for storm water management. The non-potable uses were designated for building usage such as toilet flushing, irrigation, and water features. The storage component of the cistern was designed to control the storm event to the Maximum Extent Technically Feasible. The owner set a goal for the project to meet the LEED criteria Gold standard as a minimum design guideline which required a sustainable approach to construction pollution control and stormwater management . The effective ways to meet the challenge included the use of a storage vault, green roofs applications, and the reuse of stormwater (rainwater harvesting). As a component of the water reuse, no potable water is to be used for irrigation as appropriate plantings were chosen to reduce the irrigation needs.

Room 204 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Dennis Funk, Gannett Fleming, Inc.
Presenter Email: DFUNK@GFNET.COM
Title: Going Deep to Avoid Conflict - Microtunnel Application for Pipeline Construction
Abstract: To minimize the environmental and cultural impacts of the construction of a large diameter wastewater force main/pressure sewer, the Washington Suburban Sanitary Commission (WSSC) constructed several sections of the pipeline by microtunneling, a trenchless construction technique to install pipe on a precise line and grade to lengths over 1500 feet. As permit requirements and minimizing environmental impacts becoming a greater driving force in project design, the use of trenchless methods such as microtunnel construction will become more common in utility construction. The reference project is the construction of a new 5-mile long 48-inch diameter force main and 42-inch pressure sewer to convey up to 70 MGD of wastewater from the Broad Creek Pump Station to the Piscataway Wastewater Treatment Plant. The alignment study identified several areas where microtunneling would allow the project to meet the requirements of various regulatory agencies as well as reducing the overall impact to the local community. The final design was prepared with eight sections of microtunnel construction with 60-inch to 66-inch casing pipe, and three drives exceeding up to 1300 feet in length. Although the subject project is a wastewater pipeline, the discussions are equally relevant for large diameter water main projects. The presentation will address the engineering aspects of microtunnel designs, which are different than for conventional pipeline construction, beginning with the geotechnical investigations and the horizontal and vertical alignment design. Contractual considerations for the construction bid documents will also be addressed. The presentation will provide an overview of a current complex project, and will highlight some the design aspects for the microtunneling sections. The presentation will also include information on construction aspects and challenges faced by the project team such as work space requirements and inspection monitoring. The construction photos and project graphics lend themselves well to convey useful information on an interesting and less commonly employed construction technique.

Room 204 August 30th, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Scott Naiva, Milliken Infrastructure Solutions, LLC
Presenter Email: Scott.Naiva@milliken.com
Title: 72 Inch Brick Sewer Rehabilitation in Downtown Washington DC
Abstract: The Washington DC sewer system, managed by DC Water, was built over many decades and includes a mix of pipe systems including large diameter brick structures. As these pipes age, they are increasingly in need of repair. This paper focuses on a 175 linear foot section of 72 inch brick sewer located on the F-Street NW block between 12th and 11th streets. The existing brick pipe had a significant crack at the crown. The F Street thoroughfare is a heavily trafficked business and tourist district. DC Water decided to rehab this pipe at night to minimize traffic and bypass requirements. In the fall of 2015, DC water granted approval for geopolymer lining systems as a corrosion resistant, structural pipe rehabilitation solution. This pipe was rehabilitated with Milliken's GeoSpray® geopolymer mortar using Inland Pipe Rehabilitation's (IPR's) Ecocast™ installation method. The repair was completed early July 2016 and took approximately 3 weeks. This paper reviews the selection criteria and material characteristics that lead DC Water to choose a geopolymer solution. LINING OPTIONS DC WATER considered 5 options; these included Cured in Place Pipe (CIPP), Steel tunnel liner plate, Centrifugally Cast Concrete Pipe (CCCP), Shotcrete Calcium Aluminate Pipe (SCCAP), and Spincast Geopolymer Pipe (SCGP). SCGP was selected because it is cost effective, corrosion resistant, environmentally friendly, small construction footprint, and uses a thin structural liner that did not require removal of the manhole frame and cover. DC Water ran their own in house finite element models (FEM) on the 72" diameter and assumed a partially deteriorated pipe condition. The design required 2.5 inches of SCGP with WWR 4x4 -W2 xW2 – placed 5ft. wide each side of the cracked crown.

Room 204 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Prabhushankar Chandrasekeran, Greeley and Hansen
Presenter Email: pchandrasekeran@greeley-hansen.com
Title: Negotiating WSSC's consent decree extension using a data-driven mathematical model
Abstract: Since December 2005, WSSC has been under consent decree that has the goal of reducing the Sanitary Sewer Overflows (SSO). WSSC is required to comply with numerous requirements as stated in the Thirteen Articles of the Consent Decree (CD). Article Six of the CD is the largest component involving the repair, rehabilitation, and replacement of over 17,000 assets in 1,500 project sites that are located within 21 sewer basins and at a cost of more than $1.0B. Faced with an aggressive schedule that required completing Article Six activities by December 7, 2015, WSSC implemented numerous strategies including but not limited to advance procurement of Indefinite Delivery Indefinite Quantity (IDIQ) contracts; grouping of projects into three programs namely Roads, Laterals and Environmentally Sensitive Areas (ESA); procurement of design and management consultants to augment WSSC's team; developing tools and mechanism to track progress; pro-active public and contractor outreach activities. As of June 2015, WSSC finished the sewer repair, rehabilitation and replacement (SR3) of over 10,000 collection system assets and was left with over 7000 assets to be fixed before the Article Six deadline. Over 95% of the outstanding assets were part of the ESA program, which included projects located within forested areas, wetlands, protected historic sites, private properties and stream valleys, that required extensive number of permits and approvals from private entities, local, state and federal agencies prior to construction. ESA projects, at 21 different sewer basins spread across two large counties in Maryland, required Joint Permits from United States Army Corps of Engineers (USACE) and Maryland Department of Environment (MDE), Forest Stand Delineation and Forest Conservation Plan approval from the Maryland Department of Natural Resources (DNR), stream construction permits from the counties and local parks, Right of Entry (ROE) approval and potential condemnation process to gain access to project sites, and utility construction permits from local governments. Because of the extremely aggressive nature of consent decree schedule, delays caused to activities before construction were starting to affect subsequent activities in all the 21 sewer basins. WSSC developed an excel-based mathematical model to analyze the extent of negative impacts to the consent decree schedule by various factors (independent variables) that impacted the duration of multiple activities of each rehabilitation project and determine the date of substantial completion (dependent variable) of over 230 construction projects located within 21 different sewer basins spread across the Montgomery and Prince George's counties of Maryland. The model was built to include multiple activities (past and future) for each on-going and future construction projects. Based on the results of the mathematical model and additional scenario analysis, WSSC was able to successfully negotiate an extension of 6 years to their final deadline. The presentation will focus on the mathematical model developed to analyze the various factors that impacted the consent decree timeline. The approach used by WSSC can serve as a framework for other similar agencies for negotiating the deadline of a new consent decree and/or extensions.

Room 204 August 30th, 2017 1:30:00 PM to 2:00:00 PM
Presenter: Matt Roder, Greeley and Hansen
Presenter Email: mroder@greeley-hansen.com
Title: What's Eating Our Pipe? - Condition Assessment and Corrosion Investigation For a Large Diameter Sewer
Abstract: The Washington Suburban Sanitary Commission (WSSC) owns and operates the Anacostia Trunk Sewer (ATS). The ATS was constructed in 1977 and varies in diameter from 96 inches to 102 inches and carries an average daily flow of 45 MGD. It carries one-third of the flows WSSC sends to the Blue Plains AWTP. WSSC recently undertook a program to inspect 10,700 linear feet of the ATS to determine the extent of hydrogen sulfide corrosion and to model the generation and release of hydrogen sulfide gas. This presentation describes the methods of the investigations and their results, as well as the rehabilitation measures for the ATS. WSSC selected [AA1] a multi-sensor investigation technology to perform the pipe investigations. The multi-sensor uses laser scanning equipment, sonar, CCTV, and gas detection equipment to collect data inside the ATS. The laser scanning information was used to measure concrete loss from the inside pipe wall. The CCTV allowed for a visual assessment of any pipe defects to PACP standards. The laser scan revealed significant concrete loss from the pipe walls, especially along the spring line. The CCTV videos showed exposed reinforcing steel in major sections of the ATS. WSSC performed a structural analysis that revealed that loss of pipe wall thickness is causing 19% overstressing in the pipe. WSSC determined that the pipe is at the end of its useful life. There was also significant structural damage from corrosion in the manholes along the ATS. The modeling involved extensive sampling and modeling to better understand how hydrogen sulfide gas is generated and released in the ATS. The model used data collected on sulfide concentration in the wastewater, water temperature, chemical oxygen demand, and other parameters to model the generation of hydrogen sulfide. It also used information on the slope, flow, and hydraulic grade line to predict the release of hydrogen sulfide gas into the headspace of the ATS. The results of the model helped identify the most important factors in hydrogen sulfide generation and the locations of the most hydrogen sulfide release. Low wastewater pH and high upstream dissolved sulfide concentration were identified as the most important factors in hydrogen sulfide generation. The model identified areas where the pipe slope decreases and areas where flow changes cause turbulence as the locations with the most hydrogen sulfide release. The areas upstream of siphons in the ATS exhibited turbulent flow and showed the expected severe corrosion. Rehabilitation of the upstream 4,500 linear feet of the ATS will begin in 2017. WSSC is preparing to install a corrosion-resistant spiral-wound liner in the ATS to provide structural support to the existing pipes. Other measures include structural repair and corrosion-resistant epoxy coatings for the manholes and a new, taller decorative vent stack for one of the manholes. WSSC expects design of the rehabilitation of the downstream 6,200 linear feet of the ATS and the associated manholes to be complete in 2017.

Room 204 August 30th, 2017 2:00:00 PM to 2:30:00 PM
Presenter: M. Ella Garcia, DC Water
Presenter Email: ella.garcia@dcwater.com
Title: Kennedy Center Presents: Challenging DC Water Interceptor Cleaning Project under the Kennedy Center for Performing Arts
Abstract: The Upper Potomac Interceptor Relief Sewer 81-inch x 156-inch (UPIRS) conveys flow from the Maryland–District of Columbia border to Potomac Pumping Station (PPS). This critical sewer in the DC Water system conveys nearly 100 MGD during dry weather and over 400 MGD during wet weather. During the spring of 2014, the UPIRS and the parallel 48-inch Upper Potomac Interceptor (UPI) experienced wet weather overflow events along the scenic and heavily-used Capital Crescent Trail during two large storms that occurred in April and May of 2014. The need to understand and mitigate the causes of the overflows triggered inspections of the UPIRS and subsequent Heavy Cleaning activities. The complexities involved in working on the UPIRS included: Coordination with multiple stakeholders; Limited access (a large portion located under the Kennedy Center for Performing Arts and other National Park Service property); Two 90-degree bends forming an “S-curve” pipe configuration; and Flow levels near surcharge conditions during dry weather and routinely surcharged during wet weather. In early 2015 DC Water worked with an inspection contractor to develop a plan that used a combination of traditional CCTV and sonar inspections. Sonar data indicated the debris levels equated to approximately 40,000 cubic feet in the portion of the UPIRS immediately upstream of the PPS and downstream of the area where the overflows were experienced. The sonar inspections also identified critical areas where debris levels as high as 52 inches. Modeling results indicated that sediment levels contributed to hydraulic grade line (HGL) increases of approximately 1 to 2 feet along the Capital Crescent Trail. These results supported the decision to clean the UPIRS in order to improve the condition and operations of this critical asset. Because of the complexity of the system and cleaning required, as well as the pressure both internally and from external stakeholders (primarily Kennedy Center for access and NPS to avoid future spills), DC Water used a fast-tracked procurement process with prequalification of all bidders. A key requirement was the innovative use of recycled sewer water for cleaning as well as being able to reach an estimated 3,200 linear feet from one location. The UPIRS Heavy Cleaning Project was awarded and notice to proceed was given on December 14, 2015, saving significant time compared to typical DC Water procurement processes. Complex systems require technical and managerial innovation to successfully complete activities: Using recycled water resulted in saving 15 million gallons of potable water; providing a much more sustainable approach for cleaning sewers; the contractor’s flexibility and ingenuity allowed mobilization of large heavy cleaning equipment on very small spaces at the PPS; and cleaning executed adjacent to the PPS’ bar screens requiring an incredible degree of accuracy to eliminate any possibility of downstream migration. Cleaning 3200 feet of the UPRIS and removal of significant debris was completed in June 2016, about 6 months after NTP was issued.

Room 204 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Tiffany Harrison, Gannett Fleming, Inc.
Presenter Email: tharrison@gfnet.com
Title: Challenges of Cleaning Large Diameter Sewers in an Urban Environment
Abstract: Introduction: Baltimore City entered into a Consent Decree in September 2002 with the Environmental Protection Agency to address sanitary/combined sewer overflows. The decree complements ongoing efforts to address these issues and upgrade the wastewater collection system to ensure public/environmental health. The Outfall Sewershed is one of the focus areas of the City. The main Outfall Sewers carry flow from portions of the City to the Back River Wastewater Treatment Plant. The Outfall Interceptor Sewer was constructed in 1904 (concrete conduit as large as 132 inches high by 147 inches wide) and it continues to function as the City's main conduit in this area. A parallel Relief Sewer (up to 120 inches in diameter) was constructed in the 1960s to provide additional capacity. It was well known that the Outfall Sewers were slowly filling up with solids over the years, and a study performed in 2007 using sonar technology accurately determined that the sewers had an average depth of three feet of sediment/solids accumulating in the invert. This serious reduction of flow capacity resulted in the City issuing a cleaning contract for the Outfall Sewers. Process and Challenges: The presentation will consist of a description of the cleaning operation and the challenges encountered. The cleaning operation consisted of a system of two trucks, one on the downstream manhole and one on the upstream manhole. Together the trucks provided a total of 250 gpm @ 2000 psi of water to a jetter nozzle. Within the surcharged pipes a submersible pump is lowered into an access point and captures all of the material jetted to the downstream manhole. The water and solids pumped from the manhole are directed into an enclosed dewatering box. Once the dewatering box has been filled with solids, another box can be connected to the pump/decant hoses so that no working time is lost and the full container can be hauled to disposal. When the segment has been cleaned, sonar is performed to ensure that the criteria of 98% clean with a maximum sediment depth of four inches, has been met. If these requirements are not met, the pipe segment must be re-cleaned. Challenges faced included working in a heavily travelled urban environment, requiring extensive traffic control. The characteristics of the debris and the density of the material being removed also presented complications during the cleaning. Lessons Learned and Conclusions: A total of 29,340 feet of each line was cleaned with an estimated 27,000 tons of sediment removed. Rags present in the sewers slowed the cleaning process down. As rags clog the pump, the pump must be shut off and freed from the rags before the cleaning can continue. Lessons learned during the large diameter cleaning project will be shared. It can be concluded that even very old (more than 100 years old) infrastructure can have remaining service life if operated and maintained properly. This project is in the final stages and is expected to be completed in early 2017.

Room 204 August 30th, 2017 3:30:00 PM to 4:00:00 PM
Presenter: Jeffrey Grow, RK&K
Presenter Email: jgrow@rkk.com
Title: Transient Events and Control to Prevent Damage to Sewage Force Mains
Abstract: From the time that pumping stations and force mains have been utilized for transporting sewage, issues have arisen due to events that cause a change in velocity, such as pump shut off or valve closure. These events cause transient pressure waves to travel back and forth within the force main. Means to address these transients have included stronger pipelines, surge relief valves, combination air release/vacuum relief valves (CAVs), surge tanks, as well as other means. With the use of personal computers and transient event software, better determinations can be made regarding the use and location of transient control. This abstract presents information regarding the importance of modeling sewage pumping stations and force mains and the selection of transient control methods to prevent long-term damage to force mains. An example is considered utilizing information from an existing sewage pumping station and force main in Baltimore County, MD with the control options considered and the decision to use CAVs along the force main to control transient events. A discussion of the merits and use of some transient controls will be discussed. Based upon the modeling of the Patapsco Sewage Pumping Station and Force Main in Baltimore County, MD, CAVs were sized and located along the force main to provide a means of control for transient events. The predicted transient pressures without any means of control were predicted to potentially exceed the maximum allowable pressure of the pipe and approach 290 psi. As there were pipe failures that may have been precipitated by high surge pressures and/or these pressures in combination with the failure of the steel banding in the 1970's era PCCP pipe manufacturing date, options were considered to alleviate the surge pressures. Based upon the hydraulic transient model, four (4) CAVs were located along the force main. Upon completion and installation of the CAVs along the force main, pressure data was obtained by Baltimore County that demonstrated the pressures were not exceeding 70 psi upon power failure and associated sudden shutdown of the pump motors. The modeling predicted the pressures would not exceed 90 psi. The implementation of the CAVs was able to prevent vapor cavitation and the corresponding upsurge caused by the rejoinder of water columns as a result of water column separation thereby saving the force main from further breaks and damage, and preventing catastrophic failure of the pipeline. Benefits of understanding potential transient events during various operating scenarios of a pumping station and the effects on the force main as a result of planning for means of transient control include: prevention of pipe burst or collapse of the force main and corresponding potential pollution events upon proper selection of transient control, and capital cost savings of replacement of damaged piping.

Room 204 August 30th, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Cece Nguyen, Brown and Caldwell
Presenter Email: CNguyen@brwncald.com
Title: Baltimore Siphon Rehabilitation: Changing Conditions, Dynamic Solutions

Abstract: In February 2015, the City of Baltimore discovered a crack in a 24-inch RCP sanitary siphon. Unfortunately, the 24-inch siphon is part of a 3-barrel concrete encased siphon (1-24” and 2-36”) that was built in 1931, traversed across backyards, and crossed a stream. The siphons, 700 feet long, had never been cleaned or inspected. In addition, the stream had incised so much that the stream bed is now below the siphon pipes, causing the pipes to be exposed, with no soil supporting them. Several challenges had to be addressed before rehabilitation could begin. The first course of action was to seal the crack externally to stop the sewage leak into the stream. The second step was to assess the condition of the pipe, both internally and externally. Cleaning was not able to be completed because the 24-inch pipe was completely filled with debris and grit, and the configuration of the siphon chamber did not permit the re-direction of flow into the other siphons. Short-term and long-term solutions were developed to provide emergency repairs to re-support the pipes (e.g., geotubes), by-pass 40 mgd of flow to assess the internal condition of all 3-siphons, perform a condition assessment to develop trenchless rehabilitation recommendations and designs, and provide stream restoration designs. This paper will cover the technologies used to perform the condition assessment, the trenchless technologies considered and used to rehabilitate the siphons, and the use of trenchless tools to develop dynamic solutions in addressing the challenges of accessing and rehabilitating a siphon.

Room 204 August 30th, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Jonathan Pollard, Atkins
Presenter Email: Jonathan.Pollard@atkinsglobal.com
Title: Investigating and Correcting Source of Pump No.4 Air Binding at Marley SPS in Anne Arundel County

Abstract: Atkins was retained by Anne Arundel County to evaluate the wet well conditions at the Marley Sewage Pump Station and provide a Report presenting the findings to the County. The pump station is a wet well / dry well configuration with dry-pit submersible pumps. The original pump station was built in 1958 and appears to have followed standard pump station design practices from that time. Since the original construction, the pump station was upgraded twice in the 1970’s and again in 2013. These upgrades included the expansion of the wetwell, the addition of an influent grinder and replacement of the pumps. Under normal operating conditions, one of the four dry-pit submersible pumps does not operate properly, thereby requiring the County to modify their operation strategy for the pump station. Pump No. 4 becomes air-bound when in operation and has been temporarily removed from the control strategy. During a site visit, Atkins observed a shear line in the surface of the wet well where vortices were moving from the grinder channel discharge directly towards the Pump No. 4. Dye was introduced into the influent flow to better understand the overall movement of the sewage within the wetwell and to aid in providing a solution to mitigate the air binding of the pump. In addition to the vortices, air bubbles were observed surfacing within the wetwell, indicating that air was being driven into the wet well sewage by the influent flow. This entrained air was then being carried directly to the pump intake, where it was then accumulating at the eye of the impeller, to the point where the pump became air-bound. Atkins presented 5 initial options for removing the entrained air to the County. The team met with County staff to include their input on the final selections to be presented in the report. Of these options, 3 were selected to be included in the report, along with a hybrid option of one. The hybrid option was suggested by the County during the review meeting. All of the options were designed to redirect the flow path of the sewer such that it followed a longer flow path and expanded the cross sectional area of the flow. All of these options added time to the retention of the sewage, allowing the entrained air to surface. The recommended option was for the hybrid baffle wall. In lieu of using an aluminum or stainless steel wall, the County had suggested a concrete structure be used. The hybrid baffle wall follows the same configuration as the two metal options, the main difference being the manner in which the concrete baffle wall will be secured within the wet well. The County is currently preparing to solicit an RFP for the design and construction oversight of this work.

Room 204 August 31st, 2017 8:30:00 AM to 9:00:00 AM

Presenter: Beth Kilbourne, WSSC
Presenter Email: beth.kilbourne@wsscwater.com

Title: Innovation to Solutions: Clearwater to Tackle Private, Leaky Pipes

Abstract: WSSC is turning their attention to the private sewer pipe systems that are often old, leaky and contribute excessive clear water into the wastewater collection system. WSSC is embarking on a Clearwater Program to reduce sewer system infiltration and inflow (I/I) from both public and private side sources under two tracks. Clearwater refers to all I/I into WSSC's sanitary sewer system, which includes groundwater infiltration as well as wet weather rainfall I/I. On the public track, WSSC is continuing its work on renewal of mainline sewer assets e.g., manholes and pipelines as part of the Consent Decree and regular maintenance programs. On the private track, WSSC has obtained approval from the General Counsel's Office to begin a program to investigate and rehabilitate private I/I sources. Spending public funds to fix private property sewer assets for the good of the public can be risky; therefore, the Clearwater approach must be both financially and politically feasible. Initially, the Clearwater Program was created as a way to allow developers to expedite development and connection to hydraulically challenged sewersheds and provide an alternative to large, expensive wet weather-driven capacity enhancements. This includes fostering economic development/redevelopment through a program that provides flow credits for rehabilitation work conducted by the developer. Additionally, the Program was developed to fully address leakage from private sources and show that this work provided significant measurable impacts on the overall sewer system capacity. This Program includes evaluation and rehabilitation of laterals, cleanouts, roof leaders, area drains, sump pumps, foundations drains, floor drains, etc. In WSSC, some residences were allowed to be originally constructed with clear water connections to the sanitary sewer, which need to be addressed. The Program will also quantify the private I/I contribution to the system; establish acceptable rehabilitation techniques for private I/I sources; quantify reductions in I/I through private side rehabilitation; evaluate the cost-benefit ratio for extrapolation system-wide of these reductions; determine policy and code modifications; and identify stakeholders within the private side rehabilitation process. Additional goals of the Clearwater include accelerating regulatory compliance, lowering WSSC rehabilitation costs, and leveraging contracting approaches. WSSC has completed code revisions and implemented new system processes to allow developers to complete rehabilitation work. This work involves the close coordination between WSSC, developers and their consultants to identify areas for rehabilitation work, complete construction and receive credits to allow development to move forward. In addition, work has begun on the WSSC Clearwater Pilot Program by establishing a Project Management Plan and selecting of pilot areas to begin field investigations. Additional work that is anticipated to be completed next includes flow monitoring, source detection work, public outreach, and rehabilitation. A few benefits and outcomes of the Pilot Program include allowing WSSC to evaluate the cost: benefit to extrapolate the program across the entire WSSC system, determining I/I reduction benefits of various private side technologies, evaluating homeowner communications/education issues, and determining policy and code modifications.

Room 204 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: James Woods, City of Rockville DPW
Presenter Email: jwoods@rockvillemd.gov
Title: Public-Private Partnership in Rockville Solves Wastewater Collection System Capacity Constraints
Abstract: The East Rockville Sewer Capacity Improvements Project solved collection system capacity constraints in Rockville's Town Center and replaced aging wastewater collection system infrastructure through a public/private partnership. Rockville's extensive flow monitoring and hydraulic modeling identified significant capacity constraints in the two sewersheds (Cabin John and Rock Creek) that serve Rockville's Town Center. Rockville's Adequate Public Facilities Ordinance (APFO) requires sufficient wastewater capacity be available for proposed development. As developments are planned, wastewater capacity is assessed. If capacity constraints are identified, a mitigation plan must be approved before a building permit is issued, and the constraints must be relieved before the building is occupied. Rockville may relieve capacity constraints through its Capital Improvement Program (CIP); or developers may elect to perform capacity mitigation with approval and permits from Rockville. Potential development in 75% of Rockville Town Center area depended on increasing the capacity in these two sewersheds. The Project supports three of the City of Rockville Mayor and Council's Critical Success Factors: Fiscal Responsibility, Responsible Economic Growth, and Stewardship of Infrastructure. Rockville programmed the relief of the Cabin John and Rock Creek sewer capacity improvement projects into its Sewer Rehab and Improvements CIP project. Through the CIP, Rockville planned to relieve the constraints in both sewersheds by 2020. Even with this planned relief, several proposed developments in Town Center would be delayed. Rockville proposed a public/private partnership with private developers to advance the Project's timeline to coincide with the proposed development schedule. To leverage the developer funding, Rockville re-prioritized its Sewer Rehabilitation CIP program to fund its portion of the Project. Project design began in 2014 and construction began in December of 2015. Through the Public/Private Partnership Agreement, developers contributed over $1.5 million (42% of the expected total project cost) towards the Project. The Project diverted a portion of wastewater flow from the Cabin John Sewershed to the Rock Creek Sewershed without a wastewater pump station. To accommodate the additional flow from the Cabin John Sewershed and Rockville's Master Plan level of proposed flow, approximately 4,300 linear feet of existing sanitary sewer pipe was upgraded from 10" and 12" pipe to 18" pipe through open cut excavation and jack and bore in the Rock Creek Sewershed. This avoided upgrading over 4,500 linear feet of sewer pipe in the Cabin John Sewershed and relieved over 1,000 linear feet of existing capacity constraints in the Rock Creek Sewershed. The design and construction overcame many complex issues including: open cut installation of sewer pipe across MD-355 and beneath a WMATA and CSX railroad overpass; open-cut excavation in residential neighborhoods exceeding 20-foot vertical depth; easement acquisition on private property (including from a former Rockville Mayor); jack and bore installation through 200 linear feet of rock in excess of 20-foot vertical depth within 12 feet of an existing home; managing many utility conflicts; and developing complex traffic control measures adjacent to the Rockville Metro Station. The completion of the project is expected in early 2017.

Room 204 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Julie Barown, P.E., Orenco Systems, Inc.
Presenter Email: jbarown@orenco.com
Title: Vero Beach, FL Case Study: An Economical, Low-Impact Wastewater Collection System
Abstract: Residents and government officials near Vero Beach, Florida (population ~15,750), were concerned that nutrient runoff into the Indian River Lagoon was connected to a loss of sea grass habitat and the unexplained deaths of marine life in the lagoon. Approximately 1,500 homes in the area had septic systems, many of which were antiquated and failing. Experts believed these systems were contributing to the environmental degradation of the lagoon and its wildlife habitat. However, because the cost to expand their existing gravity sewer was estimated at $22.5 million and there were some significant site constraints that made installation difficult, the City decided to evaluate decentralized collection options. After careful research, the City selected an effluent sewer collection system which was estimated to cost $11 million — approximately half that of the proposed gravity system. There were several additional benefits to the effluent sewer option. Most importantly, the City determined that the "availability cost" — which was defined as the cost of installing just the mainlines and components (not including the on-lot portion of the system) — of the effluent sewer system was estimated to be $885,000 (less than $600 per lot). An expansion of the city's gravity sewer would cost more than ten times that amount. And because of this savings and the cost deferred to the on-lot portion of the system, the City was able to allow for voluntary connection to the system, whereas mandatory connection would be required to fund a gravity expansion. In addition to the initial capital and availability cost savings, Vero Beach chose an Orenco Sewer to minimize construction impact, provide for low operation and maintenance (O&M) costs, and reduce the impact of infiltration on the collection and treatment system. Construction impacts for Orenco Sewers are minimal. Effluent sewers require light machinery for shallow trenches or directional boring that follows the contour of the land. In Vero Beach, directional boring is being used to eliminate potential harm to historic live oak trees in the area. In contrast, installation of a gravity sewer would have required heavy equipment for making deep excavations, tearing up existing roads, and relocating existing utilities. The estimated O&M cost difference between an effluent sewer and expanding the gravity sewer was only $0.76 per month per connection, while the debt to retire the construction cost was drastically reduced. Monthly base sewer rates are $19.89 per equivalent dwelling unit (EDU), with an additional $3.59 per 1000 gallons up to 10,000 gallons. Finally, the collection system was constructed using very stringent specifications and construction oversight to ensure the watertightness of the whole system. This allows for reduced hydraulic loading at the treatment plant. This well-managed, decentralized Orenco Sewer has allowed the community to take the next step toward reducing pollution from failing septic systems. The effluent sewer also serves citizens effectively with a low-cost, highly efficient wastewater solution. This presentation will provide detailed information on funding sources, the approval process, as well as capital and operational costs for the project.

Room 204 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Lisa Franke, PE, JMT
Presenter Email: lfranke@jmt.com
Title: Tunneling Uphill Through Tight DC Corridors
Abstract: DC Water owns and maintains sanitary sewers in the District of Columbia. Four interceptors in this system, at the north end of the District, cross the western half of Rock Creek Park that is owned by the National Park Service. The objective of this project is to design, bid and build a replacement interceptor through the park to allow the abandonment of two deteriorated interceptors. The only option allowed by the Park Service was an alignment though the only paved road in the area – Bingham Drive. This new interceptor will also accommodate the future abandonment of other nearby interceptors that also run through steam valleys in the park. This presentation showcases the design approach and construction methods used for eight trenchless installations of 24-inch interceptors, including a single 1,345-foot tunnel bore through rock, along narrow roadways and congested utility corridors in a maturely-forested and high-end residential neighborhood, while complying with the sometimes-conflicting requirements of six jurisdictional agencies. Due to the hilly terrain, sewer flows had to be redirected against the natural fall of the land, and therefore, buck grade. To avoid the mixed-face rock layer, and to accommodate future abandonments of other nearby interceptors that will also need to buck grade, the new system was significantly lowered with depths up to 70-feet and manholes up to 47-feet deep. Due to the existing site constraints and the depth of the new interceptor, the design focused on maximizing the trenchless methods of tunneling for pipes, and geopolymer lining for manholes.

Room 204 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Will Hinz, Whitman, Requardt & Associates
Presenter Email: whinz@wrallp.com
Title: The Planning, Design and Rehabilitation of 4,200 Linear Feet of Large Diameter 30-inch Force Main Underneath the Bush River
Abstract: The Harford County Department of Public Works had previously upgraded the Bush Creek Pumping Station to 29 MGD and installed a new 36-inch force main with a downstream sewer interceptor to provide increased conveyance capacity. The final phase of the Bush Creek project is to rehab approximately 4,200 linear feet of the existing 30-inch PCCP force main that was originally constructed in severe winter conditions in the late 1970's. The force main and adjacent 16-inch water main were installed simultaneously on a submerged "A" frame pile bent system 15-feet underneath the Bush River. This rehabilitated force main will ultimately provide partially redundant capacity for the health and safety of the community. Initial planning involved the detailed review of potential rehabilitation techniques for the existing 30-inch PCCP force main. These techniques included swage (or close-fit) lining, cured in place pipe (CIPP), or slip-lining the existing piping. Slip-lining materials and the associated structural design requirements, as well as the hydraulic impacts of each rehabilitation method were evaluated for both HDPE and Fusible PVC. Slip-lining the existing pipe with 26-inch HDPE was ultimately the chosen rehabilitation method. Due to the availability and requirement for land only access on both sides of the Bush River, the entire rehabilitation is required to be performed in one continuous 4,200 foot section. All setup and laydown areas are within existing residential areas on both sides of the river. Significant design considerations included the necessary setup, laydown areas, road closures and detours, which were required to accommodate the rehabilitation of the force main under these conditions. Additional design considerations included the ability to maintain service to three existing pump stations and a grinder pump system that connect into the existing PCCP force main. This shared force main arrangement requires portions of the existing force main to remain in service throughout the duration of the rehabilitation effort. The construction documents were organized to allow construction to occur in a phased approach. Phase A will involve accessing, cleaning and the CCTV-ing the existing line as required to verify the feasibility of slip-lining the force main. After the CCTV and inspection work is completed, the contract documents were contractually organized with the flexibility to allow the Contractor to either reconnect the existing line without performing the slip-lining operation or to complete Phase B of the project, which is the intended slip-lining installation. Alternate bid items were also included to allow the Owner to upsize the slip-lining from 26-inch to 28-inch, if this is deemed feasible upon the completion of Phase A of the construction project.

Room 204 August 31st, 2017 11:30:00 AM to 12:00:00 PM
Presenter: Khalid Qadwai, EBA Engineering, Inc.
Presenter Email: khalid.qadwai@ebaengineering.com
Title: Design and Construction of Improvements to the High Level Sewershed Collection System (HLSCS): Lessons Learned
Abstract: Under the City of Baltimore Sanitary Contract 905, EBA was assigned the evaluation, recommendation and engineering design of improvements to the sanitary sewer pipes, sewer service house connections and sewer manholes in 20 sewershed sub-basins within the High Level Sewershed Collection System (HLSCS) in Baltimore, MD. The primary goal for the project was to eliminate Sanitary Sewer Overflows (SSOs) by enhancing the hydraulic capacity and reducing the infiltration and inflow (I/I) within the designated HLSCS sub-basins. The proposed improvements were designed in order to safely convey a two-year design storm event for the year 2025 without causing any SSOs. EBA worked with a diverse group of consultants and provided both design and post-award construction services. EBA team members reviewed hundreds of sewer pipe CCTV footage and manhole inspection records, conducted flow monitoring, performed field inspection, and utilized hydraulic modeling to recommend repair and rehabilitation techniques. The project scope involved structural improvements to the sanitary sewer mains consisting of 30,578 feet of CIPP lining, 1,122 feet of open cut replacement, 32 external point repairs, 89 internal point repairs, 5,448 feet of sewer cleaning and rehabilitation of 492 manholes. The design phase include several challenges which include: data collection and verification, coordination with various Baltimore City departments, field inspections, research of existing sanitary sewer rehabilitation technologies and selection of right technology, preparation of scope of work for each repair methodology, acquisition of permits, right of ways and right of entries, database management, and community outreach. EBA also provided construction administration services for the project. These services include shop drawing review, RFI responses, submittal reviews, budgeting and scheduling, and overall project management. Several issues were encountered during construction such as: cleaning of broken 42-Inch sanitary sewer with man entry, CIPP lining with wrinkles issues, bypass pumping of a 42-Inch trunk sewer, sewer back ups in basements during cleaning, etc. These and other issues were resolved in a very timely manner and project was completed on time and under budget. The HLSCS improvements project provided a major opportunity for experimenting with different design options for the sanitary sewer pipes, manholes and SHC service laterals rehabilitation. Through hands-on coordination with its sub-consultants, EBA was able to provide quality design and post-construction services throughout the total life-cycle of the project.

Room 204 August 31st, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Paul Sayan, Louis Berger
Presenter Email: psayan@louisberger.com
Title: Flushing those Troubles Away in Baltimore County – How a Simple Non-Flushable Investigation led to big Results
Abstract: Since 2008 the Baltimore County Kings Point wastewater pump station has experienced repeated pump clogging issues from non-flushable items. A total of 32 pump shut downs were needed to address the clogging issues at a cost of over 200 labor hours and tens of thousands of dollars in labor and equipment costs. Clogging issues peaked between October 2015 and October 2016, when the Baltimore County Bureau of Utilities averaged one pump shut down per month. Like most municipalities, Baltimore County's plumbing and building codes do not address disposal into the wastewater collection system of non-flushable items. However, the Bureau of Utilities (Bureau) could not continue allocating staff and equipment resources to address the frequent clogging issue. Most municipalities rely on a public outreach program to educate constituents on the effects of non-flushable items. Absent any regulatory authority to stop constituents from disposing of non-flushable items into the collection system, the Bureau decided the simple, albeit seldom-used, approach of finding the non-flushable generator and requesting that non-flushable items be properly disposed. The Bureau tasked two pollution control analysts from the Bureau's Engineering and Regulation Division to develop a plan to investigate the pump station tributary area and locate the non-flushable generator. Within a week, the two analysts identified and met with the non-flushable generator. Since the meeting there have been no pump clogging issues. The immediate effects are impressive; however, what is just as impressive is that the two analysts had very limited background with wastewater collection system operation and/or maintenance since their primary responsibility is analyzing and reporting industrial discharges for Baltimore County. This presentation will provide a brief historical summary of the clogging issues and the resources spent to fix the clogging issues. We will also discuss how two analysts, with limited experience in operating/maintaining wastewater collection systems, developed and implemented their non-flushable investigation plan and how they were able to effectively communicate with the generator to properly dispose of their non-flushable debris.

Room 204 August 31st, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Bill Barrack, Arcadis
Presenter Email: bill.barrack@arcadis.com
Title: Inflow and Infiltration Analysis Innovations – Evaluating Actual Reduction of Rainfall Derived Inflow and Infiltration using Control Basin and Hydraulic Modeling Methods

Abstract: This presentation will explain innovative evaluation methodologies used in various completed studies for determining actual reduction of rainfall derived inflow and infiltration (RDII) through commonly implemented trenchless rehabilitation technologies on public and private property. These statistically valid reduction results in conjunction with a calibrated hydraulic model were used to quantify RDII volume reductions, predict system wide benefits of a proposed rehab program, and confirm compliance with an SSO consent decree. The predicted benefits were validated with system wide post-rehabilitation program flow monitoring data resulting in a modeling tool with the ability to extrapolate system-wide rehabilitation program benefits from specific rehabilitation technology reduction results. Specifically, this presentation will summarize: Numerous studies performed over an 8-year period that reveal repeatable measured RDII reductions ranging from 30% to over 90% from holistically rehabilitating every aspect of a sewer system (sewer mains, tap connections, manholes, and public and private lateral sewers); the benefits of using a control basin methodology to factor out the impact of seasonal and antecedent conditions on the above and document statistically defensible RDII reductions ; the model predicted benefits of a proposed rehabilitation program developed by recalibrating the hydraulic model with system wide post-rehabilitation flow monitoring information; and an approach to extrapolate system-wide rehabilitation program benefits from specific rehabilitation technology reduction results that allows for the evaluation of various rehabilitation program scenarios.

Room 204 August 31st, 2017 3:00:00 PM to 3:30:00 PM
Presenter: Srinivasa Gadiparthi, DC Water
Presenter Email: SGADIPARTHI@DCWATER.COM
Title: Elementary, Watts(on): Using Innovative Modeling Approaches to Sleuth Out Specific I/I Sources in the Watts Branch Sewershed

Abstract: This paper describes a detailed inflow/infiltration (I/I) modeling approach applied to a portion of the District of Columbia Water and Sewer Authority (DC Water) sanitary sewer system to identify basins contributing high rainfall dependent inflow/infiltration (RDII) and determine specific high contributing sources. This project used innovative modeling techniques to identify specific RDII sources (house buffer trenches within 6 feet from the building, house buffer trenches where roof drainage discharge at least 6 feet away from the building, lateral service pipe trench, main sewers trench, remaining pervious portion of the serviced area) that were contributing extraneous flow to the DC Water system, and provided DC Water with recommendations for RDII reduction projects at source level without requiring additional detailed flow monitoring data. This paper will summarize key findings about determining specific sources of I/I and how that can provide clear guidance for targeted I/I reduction activities. Watts Branch Trunk Sewer serves 988 acres within the District of Columbia, with nearly 70 miles of sewer up to 42-inches in diameter. An additional 1,160 acres contributes flow from the Washington Suburban Sanitation Commission (WSSC) service area. Flow metering completed in 2014 and again in 2015 indicated that this system has high levels of I/I contributing to the DC Water sewers. However, initial investigative activities (smoke testing) did not identify any significant sources. In order to provide a clearer understanding of the I/I sources within Watts Branch, a model was developed with following specific project objectives: 1-Calibrate a house-level model, 2-Use GIS data to develop RDII and runoff inflow contributing areas for each RDII source, 3-Shift to a physically-based representation of the flow routing process and a robust continuous simulation calibration. A key innovation of this approach applies long-term continuous simulations for model calibration. The detailed physically-based modeling of individual sources of RDII allows the model to represent the seasonal variation in groundwater during a long term continuous simulation. The RDII from individual sources was quantified within each meter basin. The contributing sources are: 1. House buffer trenches where roof drainage discharge (splash) within 6 feet from the building. 2. House buffer trenches where roof drainage discharge at least 6 feet away from the building. 3. Private lateral service pipe trench. 4. Sewer main trench. 5.Remaining pervious portion of the serviced area. The approach described in this paper allowed DC Water to quantify RDII by individual sources in Watts Branch. This allowed a more focused mitigation plan for RDII to be developed. Buffer trenches around the houses in Watts Branch are the dominant source for RDII peak flow. Buffer and mains trenches are the dominant source for RDII volume. The recommended RDII mitigation plan for peak flow and volume is roof downspout redirection to the street, and this plan would be most beneficial in meter basins AMI-24, AMI-25, and AMI-27. The recommended RDII mitigation plan for volume in public sewers is mains lining, and this plan would be most beneficial in the northern basins AMI-24, AMI-26, and AMI-29.

Room 204 August 31st, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Lauren Smith, Whitman, Requardt & Associates
Presenter Email: lsmith@wrallp.com
Title: Design of Gravity Sewer and Sewer House Connections Post-Flooding Ellicott City, MD

Abstract: Downtown Ellicott City experienced significant damage due to the 2016 Flood that occurred July 30, 2016. The City was established in 1772; due to the topography, presence of rock and the rivers, many houses along Main Street were constructed to be spanning the Tiber Branch, with river running underneath. The sewer house connections were typically suspended underneath the buildings and in the Tiber Branch river channel. During the historical flood, most of the suspended pipelines were destroyed. WRA was tasked, in an emergency situation, to resolve the damage that the flood caused by getting sewer service to the businesses and eliminating the suspended pipelines over the Tiber Branch. An initial challenge was determining the location and condition of the existing sewer house connections which had very little as-built documentation. The existing sewer house connections are interconnected and run through multiple buildings. Several field walks and surveys were necessary to determine the location and the condition of these connections. Design and construction challenges included the limited space available, the restrictive elevations of the existing house connections, and the limited depth to connect to the existing mains. WRA designed an 8-inch gravity sewer to run through Tiber Alley, directly behind the buildings spanning Tiber Branch, to provide sewer service to several of the small businesses, eliminating their existing suspended connections. A 6-inch gravity sewer and three sewer house connections were designed to be installed in the future, as this is an on-going project. Ejector pump configurations were designed for the future sewer house connections to enable them to drain to existing sewer mains, completely eliminating the need for suspended pipelines in Tiber Branch.

Room 204 August 31st, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Kenneth Knutsen, Barton & Loguidice
Presenter Email: kknutsen@bartonandloguidice.com
Title: S%!? Flows Downhill....So Why Pump It?

Abstract: The use of gravity assisted flow, or driving head, through a wastewater treatment plant is common practice for conveying flow from one unit process to the next. Where feasible, it precludes the need for pumping, which in turn reduces energy costs, and equipment operation and maintenance costs, including labor. The use of gravity assisted pressure flow in sanitary collection systems may, to some, seem unorthodox as there are no concise design guidelines for designing a pressure collection pipe that may not technically be considered a force main (because there is no pump), but also does not function as a gravity sewer. This presentation presents the hydraulic theory behind the use of "gravity assisted force mains" for several challenging sanitary collection projects in Central and Western New York State. The benefits of using this conveyance approach will be reviewed, as well as the design guidelines and modeling principals of Hazen-Williams. Three (3) project Case Studies will be discussed, each of which had client, site, and application specific design and construction challenges which ultimately led to the use of gravity assisted force main conveyance systems. The various system and equipment configurations will be presented, including some unique approaches to instrumentation and control for one site that had no power available. The projects and respective Clients were revisited during preparation of this presentation, which summarizes "Lessons Learned" during the design and start-up phases of the projects, as well as Client feedback on how these systems have been operating since being placed into service and suggested changes for improving operation and operator safety, reducing maintenance requirements, and extending asset life and level of service.

Room 204 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Matt Roder, Greeley and Hansen
Presenter Email: mroder@greeley-hansen.com
Title: Internal Coordination and Emergency Repair of a Distressed 102-inch Diameter Sewer Under an Active Storage Depot
Abstract: In 2015, WSSC and Greeley and Hansen presented the design of repairs to the 102-inch Anacostia Trunk Sewer (ATS) that runs under a stream and through a levee. The ATS had suffered extensive hydrogen sulfide corrosion. During final design of the repairs, Greeley and Hansen discovered longitudinal cracks in the ATS underneath WSSC's Anacostia Storage Depot. This presentation covers the identification and investigation of the cracks, evaluation of emergency repairs, internal coordination between multiple departments, and development of a construction sequence to allow repairs to occur concurrently with the depot activities. In late summer 2015, Greeley and Hansen identified a longitudinal crack in the crown of a section of the ATS from CCTV videos. Further investigation uncovered a multitude of other cracks in other pipe sections under the Depot. Greeley and Hansen identified the static load from warehousing valves, fittings, pipe, manhole frame & covers over the cracked pipe, and the dynamic loading from the front-end loader that travels over the ATS as the likely cause of the cracking. WSSC decided to make emergency repairs to the ATS. The repairs include encasing the top half of the pipe in reinforced concrete and installing anchors in the pipe exterior to connect to the encasement. This allowed the ATS to withstand the static loads and impact of the front-end loader on top of it until the lining repairs are complete. Prior to making the repairs, contractors performed two separate activities. First, WSSC retained a contractor to perform vacuum excavation to find the exact location of the top of the ATS. The record drawings did not include surveyed locations for the bends in the pipe or any deflections. The contractor excavated the ATS and excavated to find the parallel 72-inch (HOBUS lined) sewer. After excavation of the ATS, the contractor took core samples from the top of the ATS and measured its thickness. Core #1 was 9" and Core #2 was 6.5 inches. If the remaining concrete pipe was less than four inches thick, from an original thickness of approximately nine inches, the pipe would not be encased because of concerns that it might not support the encasement. The timing of the repairs required significant coordination between the Depot staff and the repair contractor, since the ATS must stay in service as well as the warehouse. Some measures to accommodate Depot staff include installing jersey walls to keep the front-end loader out of the excavation and staging the repair so the entire length of the pipe being repaired is not exposed at once. WSSC took the proactive stance by installing flow re-route down the 102 if needed; incase the 102inch collapsed while performing the repair. The final paper will include construction photos, description of the coordination activities to maintain the Depot's normal operations, and figure comparing the field location of the ATS and the adjacent 72-inch sewer with the locations shown on the previous record drawings.

Room 204 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Richard (Dick) Berich, EBA Engineering, Inc.
Presenter Email: dick.berich@ebaengineering.com
Title: Design of 36-Inch Quad Avenue Wastewater Pumping Station Force Main: Challenges and Complexities
Abstract: The Quad Avenue Wastewater Pumping Station Force Main replacement has several interesting design features such as a 23 MGD bypass pumping system, construction of a valve vault to switch between the new and existing force mains, a junction chamber to tie into the existing discharge sewer, multiple railroad and I-95 crossings, and complex traffic control measures. The Quad Avenue Wastewater Pumping Station is located at the intersection of Quad Avenue and North Point Road in northeast Baltimore and was constructed in 1964. The existing 36-inch Pre-stressed concrete cylinder pipe (PCCP) force main connecting the Quad Avenue pumping station to the Outfall Relief Sewer is located adjacent to Rolling Mill Road and was constructed in 1973. The existing force main is 2,180 feet in length and runs along the east side of the North Point Road at a depth of 20 feet and crosses railroad limits encased within a 66-inch diameter steel pipe. The maximum pumping capacity with all pumps running is 16,000 gpm (23MGD) at 68 feet Total Dynamic Head (TDH). Since the existing force main has become aged and has not undergone any major maintenance, Baltimore City has planned to construct a second 36-inch DIP force main and rehabilitate the existing force main for use as a back-up. EBA was tasked with determining the most feasible design for this new 36-inch DIP force main. The schematic design evaluated several alternatives and then the best alignment was selected for design. The design of included approximately 2,000 LF of 36-inch Ductile Iron Pipe, a 36-inch flow distribution vault, air release valve vault, entry port valve vault, 48-Inch tunnel, and a junction chamber that combines the flow from the existing and proposed 36-Inch force mains. The project also involved temporarily by-passing of 23 MGD flow between the Quad Avenue Wastewater Pumping Station and the Outfall Relief Sewer. Additionally, an existing 8-inch sanitary sewer also running along the east side of the North Point Road had to be rerouted. The flow distribution vault connecting the existing 36-inch PCCP force main and the new 36-inch DIP force main had to be installed with a 45-degree wye fitting and automated 36-inch plug valves. This flow distribution vault had to be sited as close as possible to the pumping station and had to provide energy-efficient low head loss design, access to electrical equipment, and manhole access. Several issues were encountered during the design these included; obtaining permits from Norfolk Southern and AMTRAK railroads, crossing of I-95, installation of a 48-inch casing pipe under the low clearance railroad bridges and traffic control on the North Point Boulevard, thrust restraints, and several large utility crossings including 48-inch and 54-inch storm drains, and several permits. The utility crossings required adequate vertical and horizontal clearances and had to be sited within the public right of way. The project is under construction and moving smoothly.

Room 204 September 1st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Dusti Lowndes, DC Water
Presenter Email: Dusti.Lowndes@dcwater.com
Title: Sewer Emergency Containment Plan Unveiling Seminar and SECP Game
Abstract: In order to clearly define processes and protocols to be used by operations and engineering staff in the event of a sewer emergency (typically a raw sewage discharge that could result in personal injury, death, threat to public health, or damage to infrastructure), the District of Columbia Water and Sewer Authority (DC Water) established a Sewer Emergency Containment Plan (SECP). This plan, developed through rigorous and intensive stakeholder engagement process, outlines the roles and responsibilities, initial response actions, and communication protocols to be used in the event of a sewer emergency containment. This presentation will describe the SECP, the process by which it was developed, and the lessons learned that can be applied to other agencies that need to develop similar protocols. The Sewer Emergency Containment Plan is a compliment to DC Water's Emergency Management Plan (EMP) and the All Hazards Initial Response Action Plan. The SECP utilizes the Incident Command System (ICS) through an Incident Management Team (IMT) and incident action plans. The document provides general system information and guidance to plan, design, facilitate and construct emergency repairs to sewer system infrastructure. The plan and its appendices provide emergency containment information for pumping stations, the sewer system, and all 43 major sewer assets. The presentation will describe the following critical elements of the plan: Definitions of Sewer Emergencies, External Communication and Information Management, Sewer Emergency Containment Procedures, Recovery Plan, and Training and Updates. The presentation will also discuss the importance of providing site-specific stakeholder communication that is critical in the event of a sewer emergency. DC Water has compiled points of contact and reporting instructions to follow during and after an emergency, which includes a table identifying the name and contact information for property owners along each major sewer asset.

Room 204 September 1st, 2017 10:00:00 AM to 10:30:00 AM
Presenter: Eric Ritter, Louis Berger
Presenter Email: eeritt@gmail.com
Title: Optimization of Baltimore County's Preventive Maintenance Cleaning Program.
Abstract: Most wastewater collection system owners maintain a list of sewers that require frequent cleaning. Typically, these sewers that are cleaned frequently are identified from customer complaints and institutional knowledge. If a sanitary sewer overflow or a basement backup occurs due to a mainline stoppage the assumption can be made that the cleaning frequency was inadequate or the problem cannot be prevented with cleaning alone. If a stoppage occurs on a segment that is not on the current frequent cleaning list then the sewer should be considered for scheduled frequent cleaning. If left unchecked, eventually frequent cleaning obligations can overwhelm the owner's staff, equipment and/or financial resources, which is why it is best to identify and address the root cause of the maintenance defect. Once the root cause is identified, custom maintenance activities can be utilized to address the defect and monitor the location for optimization and integration into the overall maintenance programs. The Baltimore County Bureau of Utilities (Bureau) currently maintains 1,116 sewers that require frequent cleaning work, referred to as Specials (i.e. sewers with cleaning frequencies less than 7 years). When sewer blockages occur, consideration is made for adding the sewer to the Bureau's Specials list. To better manage staff/equipment resources, the Bureau has revised the Specials cleaning program based on geography. Scheduled activities were adjusted forward in time as others were strategically deferred out up to 6 months as crews swept through the entire collection system. This has greatly reduced the mobilization efforts typically spent to address the specials and has set the stage to incorporate customized maintenance activities for optimization of the preventive maintenance program. The County will incorporate the use of chemical fats, oils and grease (FOG) and root control treatments into the program to more efficiently manage the Specials obligations. This optimized maintenance program will treat the root cause of the maintenance defects, then monitor the locations to better identify the cleaning frequencies. The monitoring phase is planned to incorporate the SL RAT screening after chemical treatments are utilized for roots or grease. The goal of the SL-RAT screening work is to avoid cleaning Specials that, at the time of screening, do not require any cleaning work. Additionally, the County and Louis Berger are developing a process to review the maintenance frequency for each Special with the goal of (1) identifying and addressing the root cause of the maintenance defect to eliminate the Special or (2) optimizing its maintenance frequency. This presentation will discuss the evolution of the existing specials list and the challenges encounter during the shift from a static specials list into a well-planned and predictable yet flexible preventative maintenance program.

Room 204 September 1st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Nikolaos Apsilidis, Greeley and Hansen
Presenter Email: napsilidis@greeley-hansen.com
Title: Monitoring Combined Sewers to Establish the Baseline for the Effectiveness of Green Infrastructure

Abstract: By its completion, DC Water's Long Term Control Plan for combined sewer overflow (CSO) reduction, known as the DC Clean Rivers Project (DCCR), will reduce CSOs by 96% District-wide. To achieve this reduction, DCCR is implementing various controls including upgrades to existing sewer infrastructure, a system of large-diameter tunnels to store and convey CSO volume, and green infrastructure (GI) to manage stormwater where it falls. Essential for the evaluation of the performance of these controls is the definition of a baseline for the collection system prior to installation. To this end, this study presents the details of a rainfall and flow monitoring program, implemented in four urban sewersheds to particularly evaluate the effectiveness of GI. Seventeen sites were instrumented with rain gauges of tipping-bucket type and area-velocity flow meters. Specific criteria and protocols were developed for site selection and instrumentation installation. The volume of data and challenging hydraulics of the system necessitated an effective program for data collection, Quality Assurance and Quality Control (QA/QC), management and analysis. In-house tools for digital signal processing and stakeholder communication protocols supported instrumentation maintenance. Best practices for data QA/QC included benchmark comparisons against redundant rainfall and flow signals. At its completion, this study quantified the baseline response of the collection system to wet weather through a robust dataset of rainfall inputs and wet weather flow outputs.

Room 204 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Daniel Jeon, Louis Berger
Presenter Email: hyoungdo@hotmail.com
Title: Best Consultant of the Year goes to: Client's Perspective of Design Management Priorities in Baltimore City's $500M Consent Decree Sewer Collection Systems Improvements

Abstract: Time after time, clients' expectations of design management priorities are not met by consultants, resulting in schedule delays, budget shortfalls and regulatory consequences. In many municipalities and cities with aging and defective sewer collection systems, the consequence of delayed rehabilitations can pose public safety risk and can cause enormous financial impact, especially for consent decree driven projects. Baltimore City (the City) entered into a Consent Decree with the United States and the State of Maryland in 2002 to correct unpermitted discharges of wastewater, in violation of the Clean Water Act. Being one of first Consent Decree of its kind, Consent Decree end dates were very aggressive and the City is currently in negotiation with the regulators and working on finalizing the Modified Consent Decree. The Modified Consent Decree builds on the extensive work already accomplished, and provides for a system that will capably serve the City and protect the environment for generations to come. The Modified Consent Decree allows the most critical work to be done first in Phase I to address the most critical public health and environmental issues. By utilizing an adaptive management approach, the City will implement capacity related projects in a manner that mitigates future ratepayer impacts in Phase II. In Phase I, thirty-four (34) individual projects (approximately $500M construction costs) are either in design and construction phases to clean or rehabilitate city's sewer mains and the Back River wastewater treatment plant headworks project is underway, which by itself will reduce more than 80 percent of the sewer overflow volume in Baltimore. For the Phase I sewer rehabilitation projects, Louis Berger Water Service (LBWS) has supported the City, providing program management services since 2006. In addition to program management services, the City has been heavily reliant on engineering consultants for design and post award services. Throughout life cycle of 34 projects with 14 consultants, the City and LBWS have evaluated consultants' performance and identified shortcomings and proposed improvements. Furthermore, contract size, complexity of project, contract duration, scope of work, and other factors on these projects have been evaluated to identify if design management priorities have any impact on performance of consultants. Based on the findings of the project life cycle evaluation, consultants tend to start off with the same objectives as clients but along the way due to clients or consultants' strategic objectives, their priorities can be misaligned. Through the lens of program manager, the City and LBWS reviewed the lessons learned and have identified the best practices and approach resulting in win-win solution for all parties. This presentation will discuss design management priorities such as quality management, project execution, scope management, regulatory requirements, training/ mentoring, technical consultations with case studies from the City's projects. The goal of this presentation is to share the lessons learned and proactive design management approaches to clients and consultants that can find common ground to optimize their resources to achieve the ultimate goal, PUBLIC SAFETY AND PROTECTING ENVIRONMENT. Who wants to be the best consultants of the year!

Room 205 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Mark Notheis, CH2M
Presenter Email: mark.notheis@ch2m.com
Title: Reuse of Existing Water Treatment Infrastructure to Optimize Space Usage and Minimize Environmental Impacts for a 27-MGD Upgrade

Abstract: The City of Portsmouth Virginia's utility system is nearly 135 years old and purchased the system in its entirety on January 3, 1919 for a total cost of $2.8 million. At the core of the water system is the Lake Kilby Water Treatment Facility (WTF) located in Suffolk, Virginia. During the early 1940's the first in a series of expansions were completed. Several other expansions in the 1950's and 1960's increased the capacity of the facility to its present level of 32 million gallons per day (MGD). Additional improvements/expansions were completed in 1981, 1986, and 1997 to improve efficiency and replace infrastructure at the end of its useful life. In 2010 the City of Portsmouth embarked on developing plans for a water treatment plant upgrade to meet future regulations as well as adjust the design flow requirements to be more efficient in plant operations and delivering water to its customers. This process began with a facility plan which evaluated membrane filtration, deep bed filtration, the use of GAC filters as well as UV disinfection and ozone for DBP control. Based on the anticipated regulations and the applicability of each technology, the project moved into the design process utilizing eight new deep bed filters, chemical system improvements and the addition of ultraviolet light for disinfection to aid in DBP control. The unique characteristics of this project is that site space was very limited which required the reuse of a portion or all of the older structures. This approach helped achieve multiple benefits including facilitating the construction of the new filter complex, reducing the overall project cost, and minimizing the environmental impacts by performing construction activities within the existing structures foot print. The new filter complex will be constructed within the footprint of the old abandoned sedimentation basins. This approach incorporated the use of the existing gravity walls from the basin as an excavation support after underpinning piles were installed to prevent lateral movement of the basin wall during construction. The new filter complex required the installation of 611 18-inch diameter piles for the foundation which is a direct result of the poor soil conditions. In addition to the filter complex being constructed in the foot print of the old sedimentation basins, the design incorporated UV disinfection in the foot print of existing filter beds 11 through 16 while filters 5 – 10 were converted to a blower room for the new air scour system as well as a location for the new settle water pump station. This process of using the existing structures required a multiple sequencing phases to keep the water treatment facility in operation while the construction was completed. The construction for the three year project commenced in October 2016 with the initial phases of construction planned for completion in 2017. If this paper is selected for presentation, the authors will discuss the design, the evolution of reusing the existing structure foot prints, the environmental friendly approach, as well as discussing some of the sequencing of construction issues.

Room 205 August 30th, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Patrick Hager, RK&K
Presenter Email: phager@rkk.com
Title: Tackling Complex Water Infrastructure Relocations Within A Utility Congested Light Rail Transit Corridor

Abstract: Baltimore Red Line planning and design included 14.1-mile Light Rail Transit project connecting East Baltimore County through Downtown and Southeast Baltimore City. The east-west transit line included a combination of surface tracks, tunnels and aerial segments, fourteen (14) surface and five (5) underground stations, Park-and-Ride facilities, and an operations and maintenance facility. The proposed transit alignment traversed an urban area with congested utilities, including small and large diameter water, sewer, gas, steam, chilled water systems, electrical ductbanks, telecom, fiber optics, and overhead utilities. This presentation focuses on the project planning and design challenges in the development of complex water infrastructure relocations associated with the impacts related to the proposed surface track alignment, underground stations, and downtown tunnel portals. Also considered during the design was the potential damage associated with the estimated ground settlement related to the tunneling operations. The team evaluated existing utility impacts and required modifications to clear surface tracks, tunnel portals, and underground stations. This presented significant challenges to relocate utilities outside of the limits of proposed surface tracks and stations. City streets include a complex and congested network of underground and overhead utilities. Clearing a path for the proposed transit way involved extensive utility relocations and complex staging for utility relocations in conjunction with the civil work associated with the transit design and maintenance of traffic. Downtown stations presented significant challenges related to the slurry wall construction techniques; the stations occupied nearly the entire width of the current right-of-way, and were often located just a few feet from the face of adjacent buildings. A robust QA/QC program was developed to ensure careful and progressive coordination with various disciplines to identify and resolve conflicts between existing and proposed elements of the overall transit system design.

Room 205 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Chris Waters, Arcadis
Presenter Email: chris.waters@arcadis.com
Title: Startup & Commissioning for a New Potomac River Water Supply Raw Water Intake and Pumping Station
Abstract: This presentation will highlight critical success factors and lessons learned during the construction and startup of a new Potomac River raw supply pumping station and river intake. The pumping station and intake are part of Loudoun Water's Potomac Water Supply Program. The Potomac Raw Water Pumping Station (PRWPS) and Raw Water Intake (RWI) were constructed to provide up to 40 mgd of raw water to the new Trap Rock Water Treatment Facility via a 6-mile raw water transmission main. The RWI and PRWPS include several innovative features including fish-friendly half-barrel wedge wire screens for a shallow water application, an intake bedload deflector designed using computational fluid dynamics, and a pumping station layout with a shaft and tunnel arrangement. The 100-foot deep shaft and 200-foot-long tunnel were constructed through solid rock to preserve the scenic vistas along the Potomac River. The presentation will present unique challenges and lessons learned during construction of this innovative deep shaft pumping station. Challenges such as construction atop the 100-foot shaft, installation of the half-barrel screens at the river intake, and optimized pipe routing through the 200-foot tunnel will be discussed. This presentation will also explore the planning and coordination elements needed early on for a successful startup such as coordination with regulators, working with manufacturers to ensure proper installation, and temporary measures required for testing while other system elements are still under construction.

Room 205 August 30th, 2017 1:30:00 PM to 2:00:00 PM
Presenter: Sonia Oton, Mott MacDonald
Presenter Email: sonia.oton@mottmac.com
Title: Rehabilitation of a 72-inch and 66-inch PCCP Water Main in Downtown Washington DC
Abstract: The 72-inch / 66-inch pre-stressed concrete cylinder pipe (PCCP) water main, installed in 1961 and 1971, is a critical asset in DC Water's water distribution system. This transmission main is the primary water supply from the Washington Aqueduct's Dalecarlia Pump Station to the central, northeast, and southeast areas of DC Water's Low Service Area. Due to its criticality, material, and age, this water main scored high in the Pipeline Condition Assessment Prioritization Analysis in 2013, and was included in the top 10% of high risk transmission water mains in the distribution system. The water main runs along N Street, from NW to NE, as it passes next to the Washington Convention Center, and under the railway tracks. In 2014, the transmission water main (1.78 miles) was internally inspected using Pure's PipeDiver® electromagnetic tool and SmartBall® leak and air pocket detection tool. The water main was found to be in good condition overall. Of the 609 PCCP pipes, only 5 were determined in need of repair. No leaks were detected. A project was created in the Capital Improvement Program to rehabilitate the water main within the Asset Management framework. The repair strategy reduced planned repairs from $7M down to $2M due to a programmatic pipe condition approach. This presentation will include: 1) Pipe condition assessment results 2) Hydraulic criticality modeling results 3) Rehabilitation alternatives, selected repair strategy and costs 4) Lessons learned during the planning phase of the water main rehabilitation.

Room 205 August 30th, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Khaled Elnabolsy, GHD Inc.
Presenter Email: khaled.elnabolsy@ghd.com
Title: Bathurst Street and Teston Road Watermains A client, engineer, and contractor discussion on risk control in a small diameter tunnelling project within urban environment
Abstract: During the detailed design phase of York Region's Bathurst Street and Teston Road Watermains project, GHD proposed that a 2230 ft long section of 42" watermain be constructed using a double pass system with microtunnelling and pipe jacking (70" diameter) to provide a cost effective solution that facilitated crossings of environmentally sensitive areas. After the contract was awarded, CRS tunnelling (subcontractor) proposed through the general contractor (Memme Construction), the use of the Earth Pressure Balance Method (EPB) with segmental lining (118" diameter) for multiple reasons including resources availability and construction risk mitigation. This paper presents GHD's assessment of the feasibility of microtunnellig and pipe jacking construction methods and provdes a discussion on the bidding process of the project. The paper also presents CRS' proposal to use the alternative method of EPB and segmental lining, and the decision making process to approve the alternative method.

Room 205 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Christopher Overcash, KCI Technologies, Inc.
Presenter Email: covercash@kci.com
Title: Water and Wastewater Infrastructure Replacement in Geologically Unstable Conditions: The Piscataway Drive Slope Failure Project
Abstract: In the spring of 2014, heavy rains fell on already saturated soils, triggering a landslide in the Piscataway Hills neighborhood in Prince George's County, Maryland. Pavement cracks measuring between three to six inches wide and five feet deep appeared along 2,000 feet of Piscataway Drive. The slide accelerated rapidly on May 4, leading to a major pavement collapse of nearly four feet in one location and a large crack extending 450-feet along the roadway. Earth and trees tumbled down the 65-foot high ridge, leaving five homes sitting precariously at the edge of the newly formed cliff. Piscataway Drive provides the only access to homes leading down to Piscataway Creek, a tributary to the Potomac River. The damage also led to fractured or stressed water and sewer mains for a length of over 1,600 feet in the hillside, other damaged utilities, and an immediate road closure and evacuation of 28 homes. To confront this challenging situation, WSSC mobilized its Plant Operations and Utilities Services teams to deal with the situation at hand. Next WSSC called upon KCI's Water Wastewater Infrastructure practice through an existing open end contract to first provide an expedited alignment study in just four weeks. In just two weeks, a geotechnical team completed a comprehensive subsurface study, surveys, and environmental site review, and submitted a draft report outlining findings that pointed to a 30-foot thick layer of clay beneath the soil as the cause of the slope failure. Found throughout Southern Maryland, Marlboro Clay is known to be highly susceptible to landslides due to the significant loss of shear strength under saturated conditions. Separately, WSSC procured expert resources to conduct its own geotechnical investigations. Following the study, the full water and sewer replacement design was completed to WSSC standards to an expedited design time of 2 ½ months, in lieu of a normal design time of 6 to 9 months. This was completed by working closely with the other design teams in the roadway and geotechnical fields to meet the very short scheduling deadline. The final design included over 1,600 linear feet each of 8-inch diameter ductile iron water and sewer main and associated appurtenances which would provide additional resiliency within the newly stabilized hillside. Complex projects with demanding schedules that require constant communication between multiple disciplines and agencies are not uncommon in the water and wastewater industry. This project stands out because of the urgent nature of the project, the close and early coordination between WSSC's management team and the other stakeholders including county, public, regulatory agencies, engineers and contractors which enabled this complex problem to be solved in a timely fashion. Although there have been similar slope failures in and around the Southern Maryland region, the Piscataway Drive project was by far the most challenging, expansive, and the most high profile. In this demanding environment, WSSC's management team was able to effectively deploy the correct resources to respond to this challenging situation from an operations, maintenance, customer care and design standpoint to successfully complete the project.

Room 205 August 30th, 2017 3:30:00 PM to 4:00:00 PM
Presenter: Sonia Oton, Mott MacDonald
Presenter Email: sonia.oton@mottmac.com
Title: Spoiler Alert! Your water mains are corroding... Learn about DC Water's Corrosion Condition Assessment Program
Abstract: DC Water has about 1,250 miles of metallic water mains in the ground. Whenever metals are in contact with soils, the potential for corroding exists. An important component of DC Water's pipeline condition assessment program is collecting, managing, and using data about the environment surrounding the water mains. This includes at a minimum the corrosive condition of the surrounding soil, stray electricity currents existing in the vicinity of the pipeline, physical components of the pipeline installation, and properties of any cathodic protection systems that a pipeline may have. Corrosive soil information has been tracked longer than any other environmental parameter under the DC Water pipeline condition assessment program, and has been gathered and analyzed since 2011. The data collected includes soil chemistry analysis, in-situ soil resistivities, and DC stray current measurements. When possible, a pipe coupon is also collected to correlate the environmental condition data with the condition of the pipe wall. The soil samples are typically collected during pipe breaks and excavations associated to capital improvements projects, such as pipe and valve replacements. We will exhibit pipe samples taken from different locations around Washington DC from old 1860 pipe to newer ductile iron pipe, and we will discuss how the environmental conditions of the samples affected the conditions of the pipe. During this presentation the audience will have the opportunity to learn about: 1) The factors that aid corrosion of metallic water mains in contact with soils 2) DC Water's opportunistic corrosion investigation program 3) Correlation between corrosion parameters and the age of the pipe 4) Do Metro, street car, and gas lines affect the metallic water pipes? … come and see.

Room 205 August 30th, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Brian Ball, Black & Veatch
Presenter Email: ballbp@bv.com
Title: Condition Assessment and Rehabilitation of a 70 year old RCCP Transmission Main
Abstract: In 1942, approximately 30 miles of 34" Reinforced Concrete Cylinder Pipe (RCCP) was constructed to carry water from the Chickahominy River to the Newport News reservoirs. This project was part of a larger wartime effort funded by the Federal government to provide water to essential areas on the Peninsula. Seventy-four years later this pipe is still in use and largely performing as intended. In 2014 Newport News Waterworks began a condition inspection program for raw water pipeline crossings over various waterways. This program included the external inspection of the pipe supports for the approximately 900 foot crossing of the 34-inch pipeline over the Lee Hall Reservoir. The subsequent rehabilitation design included repairs to the concrete supports and installation of internal joint seals for exposed section of pipe. After these repairs commenced in February 2016, issues including missing mortar at joints and significant outer mortar cracking was observed. In May 2016 an internal inspection was performed to assess the internal concrete core condition and the interior joints. Additionally, a continuous video using a helmet mounted wide angle video camera was recorded during the inspection. From this inspection it was determined that the joint seal repairs would be insufficient. The project team evaluated several rehabilitation methods including CIPP, Slip-Lining, Class IV Polyurea, Carbon Fiber, Polymer Mortar, Polyurethane lining, and Joint Seals with additional repairs. The team determined that Slip-Lining was the most cost effective and reliable method of rehabilitation. The slipline was performed in December of 2016. We will detail the observations resulting from the internal inspection of the pipeline and subsequent evaluation of rehabilitation methods. We will also discuss the design and installation of the repair along with preliminary results

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Room 205 August 30th, 2017 4:30:00 PM to 5:00:00 PM
Presenter: William Darrow, Mott MacDonald
Presenter Email: William.Darrow@mottmac.com
Title: Don't forget the water mains hanging from bridges… Assessment, Prioritization and Repairs of Water Main on Bridges
Abstract: Water utilities are faced with a unique set of challenges in assessing, prioritizing, and repairing water mains on bridges. Lack of access, deferred maintenance, and budgetary constraints often lead to neglecting these critical assets. DC Water has 3.1 miles of water mains distributed across 57 bridges in Washington DC. These water mains vary in size from 8 inches to 48 inches in diameter. The water mains on bridges are considered critical assets, typically with high consequence of failure. Under the overall DC Water's pipeline condition assessment program, an annual water main on bridges inspection program was implemented in 2013, and since then water mains suspended from 56 bridges have been inspected at least once. The Water Program Management coordinates with the DDOT's (District Department of Transportation) bridge inspection program, and when the DDOT contractor inspects the bridge, the Water Program Management team inspects the water main on that bridge. The programmatic condition assessment of the water main on bridges has led to the development of a systematic approach to plan and manage the repairs to these pipelines within the Asset Management framework. This presentation will provide insight on the following topics particular to water mains on bridges: 1) Pipe condition assessment; 2) Risk analysis; 3) Prioritization as a function of condition and risk; 4) Preparation of design scope of work; 5) Design considerations for the repair of water mains on bridges.

Room 205 August 31st, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Duncan Mukira, DC Water
Presenter Email: dmukira@dcwater.com
Title: Challenges and Lessons Learned in Planning, Designing and Constructing a new 2 million gallon St. Elizabeth's Water Tower in Washington DC.
Abstract: For the first time in over seventy (70) years and with more than fifteen (15) years in Planning and Design, DC Water started construction of a new water tower located on the East side of the Anacostia River in Washington DC. The new 2 million gallon water tank will not only eliminate low water pressure issues that the residents of East Anacostia have experienced over the years, but also provide needed improved capacity for the new commercial and residential developments planned in this part of the city. Work under this project consists of constructing a composite-style 2.0 million gallon elevated water tower and 4000 feet of 24-inch water transmission main at Saint Elizabeth's East Campus The water tower will be about 150 feet high from ground level with a 50 feet diameter bowl. Together, these elements would create a new water service zone (new pressure area) within Southeastern part of the city. Other scope of work items include construction of a twelve (12) feet wide service road and demolition of an abandoned apartment building owned by the Department of Housing Authority (DCHA). The $14 million construction project is scheduled to be completed in Spring 2018. While the pumping station was built in 2008, the water storage tower was delayed in by the required approval and permit process. The planning process started in 2000 when DC Water completed a Facilities Plan that recommended creation of a new pressure zone located east of the Anacostia River to increase operation pressure and fire protection. The Facilities Plan led to a Water Tower siting study that was completed in 2007. St. Elizabeth Campus was determined to be the best site due to its high elevation and it being a District owned site. The water tower project was found to be consistent with the comprehensive plan for the Nation's Capital. However, it was found to be in conflict with Historical Preservation Elements which indicates that Federal actions in the region, should conform to protect the skyline formed by the region's natural features. In November 2009 FAA issued a height waiver for the water tower and authorized the design to proceed and in October 2014 the Zoning commission approved the final site and building plans for the water tower. During the design and construction periods, over twenty (20) permits, easements, agreements, Right of entries had to be acquired from fifteen (15) agencies in order for this project to proceed. In addition, over a hundred (100) community and agency meetings were conducted mainly to solicit comments and convince stakeholders of the need for the water tower. Some of the agencies involved in review or approval of this project included: EPA, DDOT, DDOE, USACE, WMATA, FAA, DMPED, DCRA, DCHA, DC SHPO, Zoning Commission, Ward 8 ANCs and DC Planning Board. The biggest challenge was receiving approvals from all agencies and addressing over 2000 comments from internal and external stakeholders. One lesson learned was for a project with so many diverse stakeholders, constant communication is a top priority.

Room 205 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Karen Moran, PE, Whitman, Requardt & Associates
Presenter Email: kmoran@wrallp.com
Title: Unique Design Aspects of the City of Baltimore's Druid Lake Finished Water Tanks Project
Abstract: Located in Druid Hill Park, Druid Lake is a finished drinking water reservoir within the City of Baltimore's public water supply system, with a capacity of 365 million gallons. Whitman, Requardt & Associates was retained by the City to assist the City in complying with the Safe Drinking Water Act's Long Term 2 Enhanced Surface Water Treatment Rule, which requires either covered storage for finished drinking water or additional treatment of uncovered storage prior to entering the distribution system. To address long-term SDWA compliance concerns and citizen concerns about the location of a UV disinfection facility in their neighborhood, the City elected to utilize covered storage. Completed in May 2016, design of the Druid Lake Finished Water Tanks project entailed numerous unique aspects, a few of which are summarized below. Due to system hydraulics and site constraints within the public park, the tanks were sited within the active drinking water reservoir. Design required to accomplish this included measures for installation of a cofferdam within the reservoir, along with development of stringent reservoir water quality protection and monitoring measures for the duration of the project. The AWWA D-110-13 Type III Circular Prestressed Concrete Tanks, at 400- and 550-feet in diameter, will be some of the largest of their type in the country. The tanks will have sidewater depths of 17-feet, resulting in a combined usable capacity of 54.3 million gallons. As a condition of siting the tanks within the Druid Lake, design included the creation of new park facilities atop the buried tanks. Park amenities will include a large open promenade-type space, paths, and a podium with amphitheater style seating and the capability to support a future bandshell. Grading the new park area to meet the vision of Baltimore City's Department of Recreation and Parks entailed additional structural loading on the tanks, which was incorporated in the tank design. Traditional gooseneck venting was not desired in the park setting, so decorative columns reminiscent of nearby ornamental walls were designed to conceal the tank venting. Landscaping of the new park area incorporates stormwater management features and utilizes an irrigation system to increase survivability of vegetation atop the tanks with shallower ground cover. As Druid Lake will no longer be an actively managed component of the potable water supply, the design provides for maintaining the lake level and water quality. The stormwater management system within the new park area atop the tanks is routed to supply water to the lake. A potable water feed to supplement flow to the lake was also designed in coordination with a standard operating procedure, triggered by a lake level sensor, to dechlorinate the potable water prior to entering the lake. A lake aeration system, comprised of blowers and weighted tubing with diffuser heads dispersed throughout the lake, was designed to provide adequate dissolved oxygen levels in order to sustain aquatic life and prevent stagnation.

Room 205 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Tom Caulfield, PAX Water, a UGSI Solutions Company
Presenter Email: tcaulfield@ugsicorp.com
Title: Successful Nitrification Control Using Chloramine Boosting and Mixing in Tanks
Abstract: Nitrification is a primary water quality challenge for chloramined water distribution systems throughout the Southwest. Nitrification involves the rapid proliferation of ammonia oxidizing bacteria, loss of residual disinfectant and an increase in nitrite levels. The combination of warm temperatures, excess free ammonia, and higher water age all increase the risk of nitrification. If left unaddressed, nitrification can lead to positive bacteriological samples necessitating costly water flushing, isolation and re-cleaning of water tanks, and the application of high quantities of disinfectant. These interventions are costly and cumbersome under even ideal circumstances. But in communities under mandatory reductions due to drought, flushing large volumes of water can produce significant frustration among rate payers and oversight boards – especially when considerable investments have already been made on water conservation programs. In 2014, a major investor-owned utility conducted a series of studies to determine whether nitrification could be effectively managed, and the costs of mitigation significantly reduced, using active chloramine boosting in distribution system storage tanks. Two water storage tanks were selected. Both tanks had active mixing systems and continuous on-line water quality sensors to monitor residual chlorine, temperature and other parameters. One tank was retrofitted with a closed-loop dosing and control system to feed chlorine and ammonia. During the 6-month study the portion of the distribution system around these tanks experienced several episodes of nitrification. The tank with the mixer alone experienced several specific episodes of nitrification, indicated by elevated levels of nitrite. Once nitrification was confirmed, the tank was isolated, additional chlorine was added (breakpoint chlorination), and the water was held until nitrite levels returned to normal. The tank with the active dosing and control system experienced fewer episodes of elevated nitrite. When elevated nitrite was detected, the active dosing and control system automatically administered additional disinfectant in proportions sufficient to maintain monochloramine chemistry, consume nitrite, and keep the water tank in operation. Overall, the tank with the active dosing and control system maintained higher and more stable residual chlorine levels (average of 2.4 ppm, variance of 0.014 ppm) versus the control tank without the dosing system (average of 1.5 ppm, variance of 0.163 ppm). This presentation will provide design and operational details of the study, and demonstrate the capabilities of this system for substantially reducing the frequency and magnitude of nitrification in chloraminated water systems.

Room 205 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Sarah Ghali, McKissack & McKissack
Presenter Email: sarah.ghali@mckinc.com
Title: [Don't] Take a Leak-Beyond the Headphones with DC Water: DC Water's Application of Fixed Leak Detection to Monitor Water Mains Near High Profile Construction Site
Abstract: During the construction of the DC Water Clean River (DCCR) First Street Tunnel Project in Washington DC, three water mains heaved due to the soil freezing operations associated to the construction of the tunnel shafts. As the water mains would continue to be impacted by the construction project, DC Water identified the need to monitor the mains for development of leaks during the remainder of the tunnel shaft construction. DC Water's Water Program Management evaluated, piloted and installed three continuous leak detection technologies along the 1988 48-inch ductile iron, 1922 30-inch cast iron, and 1893 6-inch cast iron water mains impacted by the Tunnel Project. Typical acoustic leak detection surveys were not considered practical for this application as construction of the tunnel shafts would continue for another 6 months, and the movement of the ground due to the soil defrosting was not expected to settle for at least 1 year after DCCR tunnel construction operations were completed. Therefore, several fixed leak detection technologies that provide continuous monitoring, autonomous correlation, and automatic alerts were evaluated and installed along these mains. The presentation will include: A summary of the technologies evaluated; Procurement, installation, and construction costs associated to the pilot of three different leak detection monitoring units; Lessons gained during the evaluation phase and technology implementation process, including: setup of the units, communication hardware, and web user interface and software requirements.

Room 205 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Russell Deason, Mott MacDonald
Presenter Email: russell.deason@mottmac.com
Title: Dude, Where's My SmartBall? When a watermain Inspection Goes Sideways.
Abstract: Mott MacDonald and Pure Technologies recently planned and executed a SmartBall PWA inspection of 4.5 miles of critical 30" 1860 cast iron water main operated by DC Water and a 48" 1923 Lockjoint reinforced concrete water main operated by the Army Corps. During the execution of this complex inspection, tracking of the SmartBall was lost triggering an extensive contingency plan and recovery effort. The purpose of this presentation is to illustrate what happens when not everything goes according to plan during an inspection and to help owners and engineers to understand the risks associated with watermain assessments and how to manage those risks. The presentation will include: (1) Planning that was done in preparation for this inspection including contingency planning. (2) Execution of the assessment and first indications of trouble. (3) Recovery effort that took place immediately following the loss of the tracking signal as the contingency plan was executed. (4) A summary of the results of the investigation that was done after the ball was recovered. (5) Lessons learned. What caused this to happen and how could it have been prevented? What is the cost/benefit of risk mitigation?

Room 205 August 31st, 2017 11:30:00 AM to 12:00:00 PM
Presenter: Russell Titus, New Jersey American Water
Presenter Email: Russell.Titus@amwater.com
Title: Silence of the Lines - Minimizing Water Losses with Acoustic Monitoring

Abstract: Main breaks are the most visible signs of aging water infrastructure, the impact of leaks and their repair interrupt customer service and add costs to water utilities operation. Leaks represent failures that offer indication that a pipe may be approaching the end of its useful life. These deteriorating pipes will leak more (background leakage), leak quieter (more difficult to find), and have higher risks of catastrophic failure. For many systems, leaks can run for extended periods of time without surfacing, adding to subsurface damage and loss of water intended to serve the customer. To minimize water loss and maintain customer levels of service, water system managers turn their attention to leak detection, pressure management and efficient response time. In 2009, American Water agreed to participate with Echologics LLC in a consortium focused on the development of fixed leak detection technology for water distribution systems, using acoustic monitors (correlating loggers). After successful field trials, the first commercial hydrant-based acoustical monitoring system was installed in 2014. In the first six months of operation, the acoustic monitoring system detected 60 leaks, most not surfacing before repairs were made, and water loss was reduced by over 10% of daily production. In late 2015, a 1000-plus node system was deployed by New Jersey American Water that paid for itself in less than 1 year, based on the recovered value of water alone. Permanent monitoring technologies drastically improve the way water main leaks are identified, prioritized, and repaired: 1) Maximize non-revenue water loss from nonsurfacing leaks, 2) Monitor leak progression, and prioritize field crew schedules, 3) Significantly reduce pipe repair costs including reduction for emergency (overtime) repairs, 4) Minimize the risks of catastrophic failures, and 5) Improve the safety of field personnel by eliminating the need for traffic controls during current leak investigations. The presentation includes: a) An overview of acoustic leak detection technologies and permanent monitoring systems, b) How permanent monitoring of water mains extends asset life, minimize the risks of failures, and create resiliency in the water system, and 3) Case studies from American Water and other utilities.

Room 205 August 31st, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Francis Bonkowski, Whitman, Requardt & Associates
Presenter Email: fbonkowski@wrallp.com
Title: Ocean City’s Newest Landmark: The Beach Ball Water Tank

Abstract: The Town of Ocean City is known for many things such as sunny skies and fun on the boardwalk, but recently a new eye catching landmark was added to the downtown area. Construction of a new 1.0 MG spheroid water tank was recently completed, with the Town electing to paint the tank as a colorful beach ball. Whitman, Requardt and Associates, LLP (WRA) provided planning and design services to the Town for the new 1.0 MG elevated water spheroid as well as the demolition two other tanks that have been in service for over 58 years. As a summer resort destination, operation of the water storage and distribution facilities poses unique challenges in providing high quality water for visitors and residents. In this presentation, we will discuss the planning and evaluations that were undertaken to assess impacts on water quality, system flows and pressures from potential upgrades to the water storage and distribution system. The Town’s hydraulic water model was used to review the impacts of replacing two aging tanks with a single larger tank with respect to water age throughout the distribution system. The planning efforts also included development of model scenarios to trace the flows through each tank to determine the actual benefit of the proposed improvements. In addition to the tank painting design, we will also present several unique engineering issues associated with implementing the project, including the geotechnical investigations and approach to minimize the settlement of the silty sand and compressible peat and clay layers. Additional unique aspects of the design will be discussed including consulting with the cellular providers that used the two existing tanks to be demolished. The providers were consulted throughout the design and construction of the tank to incorporate communications ready features into the site layout and tank design to permit them to utilize the new tank as a cell site.

Room 205 August 31st, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Laura Siemers-Kennedy, McKissack & McKissack
Presenter Email: laura.siemers-kennedy@mckinc.com
Title: Title Options: Too Much of a Good Thing? Reducing Excess Water Storage
Abstract: Washington DC's water distribution system contains 11 water storage facilities providing a total of about 100 MG of treated water storage. The Anacostia 1st High pressure zone is served by the 3 MG Ft. Stanton # 1 and 10 MG Ft. Stanton # 2 buried reservoirs. Under the storage facility upgrade program, Ft. Stanton Reservoir # 2 is scheduled to be upgraded and rehabilitated starting in 2018. The facility is now in its 8th decade of service and has been a poor performing asset over its life. Additionally, per the planned rezoning the two storage facilities will be serving a reduced area. Also, Washington DC's water demands have declined in recent years despite an increase in population. Under these conditions, DC Water recognized the need to rethink the rehabilitation program before a significant investment is spent to recondition a facility which could potentially be eliminated. A feasibility study was performed to evaluate the possibility of decommissioning the storage facility. The purpose of the study was to plan for decommissioning while balancing the needs for reliability and redundancy in the distribution system as well as the desire to avoid excessive storage which can lead to water quality issues. Hydraulic modeling and a risk assessment were undertaken to evaluate the adequacy of the storage in the system to serve the current and future demands. In addition, a risk assessment was performed for various probable operating scenarios under several demand conditions to assess the reliability and resiliency of the system if the pressure zone's only tank were out of service. The model was also used to identify potential benefits of water age reduction due to reduced storage, through extended period analysis. A condition assessment was performed to review the repair and rehabilitation needs for the storage facility. The condition assessment included a review of tank inspection data and a discussion of regulatory requirements for maintaining the facility. Ultimately, the study provided a plan to optimize storage in the zone for current and future conditions, while wisely managing capital investment and identifying potential benefits to water age in the distribution system.

Room 205 August 31st, 2017 3:00:00 PM to 3:30:00 PM
Presenter: Christine Gunsaullus, Entech Engineering, Inc.
Presenter Email: cgunsaullus@entecheng.com
Title: You Get What You Pay For: Getting the Best Value During a Tank Rehabilitation
Abstract: A 2.0 million gallon elevated tank had stood in the middle of Lansdale, PA since 1956, but had become an embarrassing eyesore. The exterior hadn't been painted since 1981 so it was long past due, with a faded logo, and rust streaks covered the roof and shell. The Owner, North Penn Water Authority (NPWA), wanted to repaint it, but faced many costly complications. The first question NPWA posed was do we really need this tank? Before spending millions of dollars to rehabilitate it, it was important to look at their system model to determine what effect 5.5 million gallons of new planned storage would have. After determining that the tank was still critical, Entech reviewed a number of short and long-term options for the tank, including overcoating the roof and shell, or building a new tank next to the old one and demolishing the old one, but ultimately determined a rehabilitation was possible albeit difficult, and the best economical long-term option. The rehabilitation of a water storage tank is a challenge for any tank owner. When you only paint it every 15 to 20 years (and remember, this one hadn't been painted in 30+ years), it can be hard to know how to sequence the work, what really needs to be done, how to get the cell carriers off the tank, and what goes into a good project specification. Basically, you don't know what you don't know, which has resulted in schedule delays, costly change orders, and premature coating failures for some tank owners. Fortunately, NPWA had a number of recently completed tank projects under their belt, and chose the same team of Entech Engineering and MBA Tank Inspectors to return for the design, bid assistance, and project management of the Lansdale Tank rehab. Throughout the project, NPWA did numerous things to ensure long-term value, including: 1. Painting the Borough's new logo on the side facing downtown for free. The excellent PR and site assistance received from the various Borough Utilities made this invaluable. 2. Selecting a more expensive 100% solids interior coating system, rather than a conventional 3-coat epoxy. NPWA understood this would provide better coverage over old pitting and the spider web of roof framing edges. 3. Working with the Cell Carriers. Nine months' notice was given so the seven carriers could properly plan getting onto a temporary pole, and paying for the redesign and construction of the new balcony handrail for carriers to reroute their coax allowed this work to be completed without incident. 4. Awarding the painting contract to the second highest bidder. This was an instance where the owner was happy to pay more. 5. Adding a mixing system, despite no current need for better water quality in this tank, but planning for the future. With the eyes of more than 16,000 residents on the team, the project was completed on time with no change orders or safety incidents. The tank is now in service, and again providing clean drinking water to the Borough.

Room 205 August 31st, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Marc Frotton, Black & Veatch
Presenter Email: pwfrot34@aacounty.org
Title: Don't Blow Your Bonnet
Abstract: Anne Arundel County Bureau of Utility Operations has reported an increasing trend of failing 6”-16” valves. The cost to repair the valves and associated water damages are often extensive. Upon evaluation of the failed valves, it was discovered that the majority of the valves themselves are in good condition; however the bolts that hold the valve together are severely corroded and the cause of the bonnet failure. The valves in question were manufactured from the mid 1990’s through approximately 2005 and were supplied with bolts that were highly susceptible to corrosion. After contacting neighboring counties, it was found that this issue was not unique to Anne Arundel County; rather it had been reported on a state as well as national level. In a joint effort between Anne Arundel County Bureau of Utility Operations and Bureau of Engineering, it was decided that preemptive measures should be taken to reduce the imminent valve failures. Approximately 5,000 valves throughout the County were identified as having defective bolts. A program for systematic replacement of corroded bolts with corrosion resistant bolts was established. The first phase of the program is underway in which several hundred valves in the neighborhoods of Crofton and Edgewater are slated for bolt replacement. A Utility Contractor was procured through the competitive bid process to perform this work and the project is underway as of January 2017. For each valve repair, a corroded bolt and soil sample were obtained for analysis. The analysis has not yet been performed at this time but the findings will be included as part of the presentation. Historical data was used to target areas where the most valve failures have already occurred. In addition, possible valve failures in areas that have the potential to disrupt traffic and business have also received high priority for repair. This valve repair work is projected to take place over the next five years. It is estimated that this preventative maintenance program will save the County millions of dollars in emergency repairs, lessen water service outages as well as alleviate public health and safety issues.

Room 205 August 31st, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Bill Roome, Hydra-Stop
Presenter Email: broome@hydra-stop.com
Title: Distribution Maintenance & Repair Techniques to Avoid System Shutdown
Abstract: Line Tapping, Line Stopping, and Valve Insertions are maintenance techniques done under pressure to reduce associated risks and provide a more productive method of maintaining and repairing distribution systems without complete system shutdown. The information provided on this technology can prove to be invaluable when designing a new service or maintaining an existing one. Line Tapping is a means to gain access into a live pipe. Line stopping is temporary means of controlling flow in the pipe where no valve is present. Valve insertions are performed to provide a permanent means of control. These processes are very efficient, allowing the utility or contractor to make the repairs, or additions without disruption of water services. The benefits of Line Tapping, Line Stopping and Valve Insertion include: Uninterrupted hydrant and valve replacement; No loss of treated water; Elimination of back siphoning; Elimination of boil orders; Safer working conditions for the operator; and increased water conservation with no discharge. The proper application of these techniques and other benefits will be discussed in this presentation. COURSE OJBECTIVE: Upon completion of this course attendees will: 1. Know and understand line tapping, line stopping, and valve insertion uses, applications, and limitations. 2. Gain an understanding of the benefits that these technologies provide. 3. Provide knowledge of this technology and which application to use when designing a new service or maintaining an existing one.

Room 205 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Susan MacNeil, DC Water
Presenter Email: susan.macneil@dcwater.com
Title: Water Main Structural Lining and Same Trench Replacement in a Former Defense Site- Spring Valley, Washington, D, C.
Abstract: Spring Valley was a former defense site in northwest Washington, DC. During World War I, the Army tested munitions and chemical warfare agents at the site. Since 1993, the U.S. Army Corps of Engineers and District Department of Energy and Environment conducted extensive investigations and actions to find and remove munitions debris, unexploded ordnances, and contaminated soil from the site. The goal of this project is to improve water quality, system reliability, water pressures, and fire flows. Although the existing water mains were constructed after WWI, DC Water adopted a conservative approach to reduce risk and ensure public safety, including performing soil testing, minimizing excavation, and having an ordnance specialist present during excavations. A hydraulic model was used to evaluate the system to see where pipes sizes were adequate and could be lined or needed to be upsized and replaced. Water main improvements include 3,400 LF of structural cured-in-place lining, 1,500 LF of water main construction, and 11,700 LF temporary water system piping. The temporary water system was modeled and designed so each of three phases of work can be isolated without impacting customers. The project includes public outreach. Construction is scheduled for spring 2017 through end of 2018.

Room 205 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Mike Jacobson, Pure Technologies
Presenter Email: mike.jacobson@puretechltd.com
Title: Case Study: Inspection and Assessment of a Large Diameter PCCP Main in the City of Baltimore
Abstract: The City of Baltimore (City) supplies drinking water to 1.8 million people in the Baltimore Metro Area and maintains 3,500 miles of water mains. Much of the City's large diameter water transmission system is comprised of Prestressed Concrete Cylinder Pipe (PCCP). Recently, the City has undertaken a comprehensive asset management program to maintain their PCCP inventory. This presentation will cover one of the City's most recent inspection and assessment projects. The pipeline of interest was the 84-Inch Herring Run PCCP Transmission Main, which is a critical link in the City's hydraulic system. The pipeline was installed in the late 1950's and had never previously been investigated. The inspection and assessment discussed in this presentation included a leak and gas pocket detection survey, an electromagnetic inspection, structural analysis, and a risk evaluation. The inspection presented a number of challenges that required extensive planning, coordination, custom solutions, and precise execution to overcome. One of the primary challenges was that any service interruption of the pipeline greater than six-hours resulted in a pressure drop for a critical customer (hospital), which in turn would have significant impacts on the customer's operations. Other significant challenges included relatively low pipeline velocity and unique constraints caused by the pipeline age and valve configuration. This presentation will provide an in-depth understanding of the planning and work required to complete a very difficult inspection. It had previously been determined that taking the main out of service for the inspection was not an option; therefore, an internal free-swimming tool was required to minimize any pipeline shutdown duration. This resulted in close coordination between the project team and the City operations group to obtain adequate flow velocities and minimize any impacts the required valve manipulation. Additionally, the temporary shutdown resulted in low pressures for certain customers, resulting in coordination with the City's Office of Communication and Community Affairs and the installation of wireless pressure monitors. The planning phase also included a project risk assessment that was used to develop risk mitigation strategies and contingency plans. Field testing was completed before the inspection to ensure that the hydraulic model adequately predicted the hydraulic response of the system throughout the inspection. Ultimately, the inspection was successful, albeit not without a few setbacks along the way. The presentation will cover the inspection results and action items resulting from the condition assessment. Lastly, lessons learned from the perspective of the owner and engineers will be discussed.

Room 205 September 1st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Mandy LeBlanc, PE, PMP, CDT, DC Water
Presenter Email: mandy.leblanc@dcwater.com
Title: Preparation and Design of a Physical and Electronic Inspection of a 66-inch Steel Water Main along 8th Street, N.E. in Washington, DC
Abstract: The District of Columbia Water and Sewer Authority (DC Water) retained O'Brien & Gere Engineers, PC to prepare concept and final design documents for the physical and electronic inspection of the Low Service 66-inch Steel Water Main. The Low Service 66-inch Steel Water Main considered as part of this project consists of approximately 8,000 linear feet of welded steel water transmission main in the Northeast section of Washington, DC along 8th Street NE between East Capitol Avenue and N. Street, NE. The installation of the 66-inch diameter steel main was constructed under four contracts. The overall pipeline is approximately 8,000 feet long with a typical ½-inch wall thickness (there are sections with ¾-inch wall thickness) and is bounded on the north and south ends by a 66-inch diameter Pre-Stressed Concrete Cylinder Pipe. This section of steel transmission main was installed in the 1960s and it is the desire of DC Water to perform a manned internal inspection of the pipeline joints and walls by visual, physical and electronic testing. Coincident with the inspection, it is the intent of the contract to repair minor defects identified as part of the assessment, including joint and point repair and internal coating system repair. The assessment program will include documentation of observed conditions and repairs, followed by disinfection prior to placing the main back into service of the main, and restoration of disturbed areas. The inspection is to consist of an interior inspection of welded steel water transmission main using confined space entry techniques. Key inspection techniques included in the project are: Full digital survey footage; Wall thickness and condition of interior pipe coating; Condition and type of all joints; Verification of interior roundness; and Broadband Electro-Magnetics (BEM) inspection for overall pipe condition assessment. Challenges of the project include: Providing a double shutdown of valves to isolate the main and provide a safe work environment; Identification of impacts to water and fire flow in the area though hydraulic and criticality analyses; Design of thrust restraint of the pipe in an urban street congested with utilities; Creation of pipe access for inspection and repairs consistent with AWWA Standard C206.11; Provision of cathodic protection throughout the project area; Assessment of inspection techniques and the requirements for pipe access; Design of access manholes and structural support to avoid imposing loads on the steel pipe; Dewatering and disinfection requirements; Construction staging and maintenance of traffic with a highly urbanized corridor; Coordination with Water Operations; Public relations and outreach with critical local facilities. The project is expected to begin in the Fall of 2018, coincident with the draining and inspection of the Brentwood Reservoir, and take approximately 7 to 8 months to complete.

Room 205 September 1st, 2017 10:00:00 AM to 10:30:00 AM

Presenter: John Marciszewski, Echologics LLC

Presenter Email: JMarciszewski@echologics.com

Title: Analysis and Verification of PCCP Stiffness Testing Using Non-Invasive Acoustics

Abstract: Life cycle management of Pre-stressed Concrete Cylinder Pipe (PCCP) presents unique challenges for water utilities, given concerns for catastrophic failures. New Jersey American Water experienced a significant rupture on a 48" PCCP pipeline in 2012. The utility's team began evaluating available PCCP test methodologies in 2013 to accelerate their knowledge of the 165+ miles of PCCP in their network. Acoustic wave propagation (AWP) testing was investigated thoroughly, given its ability to quickly test large amounts of pipeline, minimize water supply interruptions, and reduce customer disturbances. AWP survey-level testing can be used to identify concrete pipeline segments with reduced structural stiffness. Reduced pipe wall stiffness in concrete mains may be an indicator of broken prestressing wires, lower prestress, deteriorated mortar coating, cracked concrete core, and other issues. The presentation describes AWP stiffness testing in PCCP mains, and the structural and failure risk analyses (and external pipe inspection results) used to evaluate the predicted pipe stiffness. Test results are evaluated based on variability of the measured pipe stiffness within a given pipe class, and comparison of the measured versus nominal (calculated) pipe stiffness. Observations from external inspection of excavated pipe segments, used to evaluate ePulse predicted results, are also presented. The results indicate correlation of observed distress with predicted reduced pipe stiffness. This verifies that AWP testing, coupled with structural analysis of pipeline properties, can identify pipeline sections with structural deterioration for further investigation. The presentation will also include an overview of New Jersey American Water's tiered approach to pipe condition assessment.

Room 205 September 1st, 2017 10:30:00 AM to 11:00:00 AM

Presenter: David Lewis, Wachs Water Services

Presenter Email: dlewis@wachsws.com

Title: Large Water Valve Inspection and Rehabilitation in the WSSC

Abstract: THESIS STATEMENT: Attendees in this session will gain valuable insight into the strategies related to managing isolatable segments of large diameter transmission water mains. They will learn how WSSC developed and implemented a large diameter water valve inspection, repair and management program to minimize the duration and footprint of water transmission main failures. They will see firsthand the applications WSSC developed to manage the process as a whole. And finally, attendees will gain a rudimentary understanding of the concepts used to determine whether extensive valve repairs were economically feasible. ABSTRACT: Washington Suburban Sanitary Commission (WSSC) was established on May 1, 1918; its water system consists of more than 5,600 miles of pipe and is the 8th largest U.S. Water and Wastewater utility serving more than 1,000 square miles and a housing population of 1.8 Million people. It has 92 pressure zones distributing 167MGD in water mains that are up to 100 years old. Controlling this network of pipe is more than 1,700 large diameter transmission main valves. WSSC implemented a program to identify which large diameter valves were usable, determine the feasibility of repairing those which weren't and prioritize all repairs and replacements. To accomplish this, WSSC developed a project management approach that included the development of dashboards and mobile field applications for the inspection and repair of valves. They developed specifically detailed inspection protocol and an aggressive viewpoint on the repair of valves as a cost savings measure. WSSC, in the process, developed prioritization and feasibility models which are based on the impact repairs and replacements have on isolatable segments of pipe which in turn has precipitated valuable insight into where additional valve were required to reduce the footprint and duration of catastrophic failures. There are many benefits to this program and there are many potential pitfalls. Join our presentation team and explore how WSSC developed and implemented this aggressive synergistic program to control the operational circumstances related to aging infrastructure.

Room 205 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Joshua Gelman, CDM Smith
Presenter Email: gelmanjl@cdmsmith.com
Title: Design-Build Replacement of Prince William County Service Authority's Distribution and Collection SCADA System

Abstract: The Prince William County Service Authority, VA (Service Authority) is committed to providing safe, reliable drinking water and water reclamation services throughout Prince William County, while protecting the environment. The size and complexity of the distribution and collection systems requires a sophisticated SCADA system to control and monitor 125+ remote water and wastewater facilities. The Service Authority's SCADA system is a critical tool for providing system-wide monitoring from multiple locations, operations and technical support services may be dispatched in a timely manner. The Service Authority has been executing a multi-year design-build project to transform their existing RTU-based, monitor-only, proprietary SCADA system with a new fault-tolerant, open architecture, PLC-based system with servers hosting various applications, including a real-time data historian. The goal of this project has been to replace the aging SCADA system with a new system that provides more flexibility, greater functionality, and higher reliability. The sites are also being furnished with power monitoring, badge readers for access control and pan-tilt-zoom cameras for operational video. The existing SCADA system provides remote monitoring to over 3,000 separate data points using remote telemetry units (RTUs) that monitor field inputs that are polled and read by a master system. Although the system has operated satisfactorily for years, the legacy components have reached the end of their useful life, and the communications system has limited bandwidth, uses out-of-date technology, and is susceptible to single points of failure. This presentation will follow the SCADA pilot system project from inception through design and construction, followed by the design-build delivery of the full system. It will highlight key design concepts, best practices for a smooth system transition, and coordination between the owner and design-builder. The first two phases are complete with the ongoing final phase scheduled for completion in 2020.

Room 206 August 30th, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Steven Anderson, KCI Technologies, Inc
Presenter Email: steven.anderson@kci.com
Title: City of Frederick, MD WTP, Design Build Upgrades and Investigations Process

Abstract: KCI continues a successful teaming partnership with Mid-Atlantic Utilities, in performing a successful Design Build (DB) project with the City of Frederick for upgrades and improvements to the Monocacy Water Treatment Plant (WTP). The design build process is a unique opportunity for the Owner to work directly with the Design and Construction Team to ensure the most effective use of project funds. The Monocacy WTP was built in the 1960s, and operates today as a 2 MGD ADF (3 MGD Peak Flow) facility including traditional sedimentation basin preliminary treatment followed by multi-media gravity filters, and chlorine gas disinfection. The DB Team has been tasked with completing a previous design executed for the City in 2008, including separating filters for individual filter operations, and providing complete electrical and control systems upgrades to support plant treatment optimization. The DB Team approach was simply to review the plant for code compliance and operational improvements to achieve the core design basis while maintaining optimization of the treatment process. This approach led to a series of preliminary investigations during the bidding process which have been expanded and formalized to a series of Technical Memorandums including, environmental, building and electrical code compliance, pumping and chemical systems analysis, filter operations, and specialty investigations associated with plant coagulant alternatives and MDE / DNR raw water intake and screening requirements. Key recommendations which define plant improvements are: Intake and Raw Water Pump Station Screen Upgrades (MDE Study),Sedimentation Basin Rehabilitation and Enhanced Solids Settling Improvements,Filter Separation and Water Quality Upgrades,Backwash Pumps and Systems Upgrades,Chemical Systems Upgrades and Chlorine Gas Scrubber Addition,Coagulant System Replacements and Enhancements,Finished Water Pumping Upgrades and Hoisting Additions,HVAC Improvements,SCADA Expansion and Control Upgrades,Primary and Standby Power Systems Upgrades. The DB Team also included a phased construction approach separating Online and Offline Plant work activities with related permit requirements: Phase-1 Online Improvements, Phase-2 Offline Improvements The anticipated schedule included 2015 Award and Investigations, 2016 Design, Permitting & Construction, 2017 Construction. Offline Improvements such as the addition of a chemical building, and electrical room expansion to facilitate new electrical gear and standby generator facilities were classified as non-essential to existing plant operations and therefore did not require MDE permitting. This approach offers maximum utilization of the plant prior to Offline Improvements, saving the Owner substantial costs associated with supplemental water supply needs during project construction. Project permitting included floodplane investigations, stormwater management plans, standard grading and SEC plans, MDE and specialty zoning approvals summarized through a Site Plan Development (SPD) submittal process. The SPD process has delayed early construction of Offline Plant work activities, but the DB Team moved forward to complete all investigations, contract drawings, and preliminary site and building permits. The plant is presently under Phase-1 Improvements of non-essential work.

Room 206 August 30th, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Paul DiMarco, Howard County DPW
Presenter Email: pdimarco@howardcountymd.gov
Title: Rural Fire Protection Program in Howard County
Abstract: To address the need of fire protection in rural areas outside of the Water and Sewer Planned Service Area which encompasses approximately half of the County, Howard County Fire Department and Department of Public Works embarked a 15-year program to develop a rural fire protection plan. Increased development in rural areas of the County has created a need for water tankers, upgrades to emergency response equipment and access to strategically located water sources. Under the 15-year program, the County plans to install 5-10 emergency water supply systems per year for fire protection. It is anticipated that approximately 90 to 100 systems will be constructed under the program. Up to 2017, 30 water supply systems have been installed and are operational. The systems are also made available to adjacent counties, such as Montgomery and Carroll Counties. Not only does this fire protection plan improve the safety for county residents and provide a faster response time to fires, but also it will reduce homeowner insurance costs for residents. As a consultant, KCI worked with the County to standardize the emergency water supply systems including siting, access, equipment selection, specification, and details. Based on the demand, a 30,000 gallon, 10-foot diameter fiberglass reinforced plastic tank, either center or end draft, is proposed as a standard storage tank. To protect the tank, a geotextile envelope is used to separate backfill from surrounding soils. The tank system include a device for holding the tank in position against floatation. Prior to acceptance and commissioning, an operational flow test shall be conducted and witnessed by the Owner. The County coordinates with property owners for potential site selections and each site is strategically located based on spacing, access, and population density. Prior to the design, KCI and the County performs a field visit for each site to discuss the orientation of the storage tank, accessibility, traffic control, planting, permitting, easement requirements, and other siting issues. Geotechnical investigation is conducted at each site to obtain subsurface information to facilitate the design.

Room 206 August 30th, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Frank Getchell, Leggette, Brashears & Graham, Inc.
Presenter Email: frank.getchell@lbgnj.com
Title: Road Salt and Groundwater: Monitoring, Management and Mitigation Strategies
Abstract: By the late 1970s researchers and regulators started to notice an increase in chloride and sodium levels in a few streams and aquifers in the Northeast. Since then, observation of this condition has spread and intensified to the point where water from many wells in northern states consistently exhibit chloride levels over 100 ppm with rising trends. Chloride level trends for many of these wells suggest that this will be a significant and persistent groundwater quality problem for decades. When chloride levels exceed the secondary standard of 250 ppm the water has an unpleasant taste. Sodium, which is often found associated with chloride in impacted groundwater, can become a health risk for people with hypertension when levels are above 20 ppm. Chloride and sodium are especially expensive to treat, requiring reverse osmosis, which is energy intensive and creates a brine disposal issue. In many cases the cost of treatment can be prohibitive, resulting in the abandonment of contaminated wells. Studies of shallow aquifers indicate that in the majority of chloride contaminated wells, the culprit is road salt. There are steps that can be taken to avoid the problem or minimize the impact. The keys to managing this problem include pro-active monitoring, prevention, and mitigation. We present case histories from several northeastern states where chloride impacted shallow wells were traced back to historic and ongoing road salt applications, storage, and handling practices. The case histories illustrate how by defining the lateral and vertical extent of contamination using appropriately located and designed monitoring wells and sampling methods, future chloride and sodium levels can be predicted, and appropriate mitigation methods can be identified and implemented. Steps that can be taken to avoid the problem or minimize the impacts of road salt use, such as tracking chloride, sodium, and TDS levels for supply and monitoring wells, will be presented and used to show why a rising trend in any of these constituents should be a concern. Initial construction and possible reconstruction techniques for a supply well, or the use of scavenger wells as options to reduce or prevent road salt impacted groundwater from threatening the long-term viability of drinking water supplies will be explored.

Room 206 August 30th, 2017 1:30:00 PM to 2:00:00 PM
Presenter: Keith Tyson, WSSC
Presenter Email: Keith.Tyson@wsscwater.com
Title: Innovating for Future Needs: Using Zinc Coated Ductile Iron Pipe to Extend Asset Service Life
Abstract: In 2018, the Washington Suburban Sanitary Commission (WSSC), one of the largest water and wastewater utilities in the nation, will celebrate its centennial. As with other utilities, the WSSC has experienced challenges in managing the aging of its buried infrastructure. Due to various factors, of which corrosion degradation is chief among them, the WSSC continues to experience an increase in water main breaks and leaks, which in total average about 1800 per year for approximately 5700 miles of pipe. To meet current and future customer demand, the WSSC is implementing creative methods and new materials to extend the service life of its pipelines. As the WSSC moves into its second century of service to the residents of Prince George's and Montgomery Counties in the state of Maryland, it continues its leadership role in the field by introducing, in 2016, zinc coated ductile iron pipe (DIP) to its water system. The new pipe is coated with 200 g/m2 of 99 percent zinc as the primary coat and an asphaltic paint as the top coat. This system is then encased in V-BioTM polyethylene during installation, which has a corrosion inhibitor and anti-microbial additive. This innovative combination of method and material is designed to prevent corrosion and extend the life of the pipe. The WSSC also employed an innovative procurement process to purchase the new material, which made the system wide use of zinc coated DIP feasible. Additionally, the WSSC will establish a monitoring program to assess the performance of the new material. As the results of the monitoring program become available and reliable, it will be possible to quantify the advantages of the new system in comparison to other material and corrosion protection methods.

Room 206 August 30th, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Edward Osann, Natural Resources Defense Council
Presenter Email: eosann@nrdc.org
Title: Water and Revenue Losses in Pennsylvania and New Jersey Water Utilities: How Big, How Much, and How Do they Compare Nationally?
Abstract: Two studies were prepared by George Kunkel for the Natural Resources Defense Council that compared 2013 water audit data for more than 150 Pennsylvania (PA) water utilities and 76 New Jersey (NJ) utilities to validated water audit data of almost 250 USA and Canadian utilities for the same year. The studies assessed real (leakage) losses and apparent (customer) losses and the costs of both types of losses for PA and NJ utilities; projected loss levels and costs for all utilities across PA and NJ; and levels of losses that are likely to be economically recoverable. This presentation will cover key data and performance measures, and provide context for further assessing water and revenue loss levels in PA and NJ water utilities. The study offers a basis to reassess how water auditing and loss control activities as currently conducted by water utilities across the Mid-Atlantic Region.

Room 206 August 30th, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Gert van der Walt, DC Water
Presenter Email: Gert.VanDerWalt@dcwater.com
Title: Strengthening the Bonds of Your Distribution System - DC Water's Experience with AWWA's Partnership for Safe Water Distribution System Optimization Program
Abstract: The Partnership for Safe Water (PSW) is an unprecedented alliance of six prestigious drinking water organizations; American Water Works Association, U.S. Environmental Protection Agency, Association of Metropolitan Water Agencies, National Association of Water Companies, Association of State Drinking Water Administrators , Water Research Foundation. PSW's mission is to improve the quality of water delivered to customers by optimizing water system operations. Membership in the distribution program ensures that water quality improvements can be measured and validated over time. Participating systems can also benchmark their performance in relation to other utilities in their region and facilities across the nation. The benefits to participating utilities fall into five broad categories: Improved water quality Recognition Regulator confidence Consumer confidence and community support Employee support The Distribution System Optimization Program primarily consists of a self assessment using over thirty five categories. The self assessment is used to identify portions of the utility operations that are partially or not optimized and then an action plan is developed to improve system operations. Each year the action plan is reviewed to assess progress. The self assessment and action plan is submitted to a group of AWWA volunteer peer reviewers for comment. The peer review process provides valuable guidance to participating utilities. DC Water joined the PSW Distribution System Optimization program in the fall of 2015 and developed a detailed workflow process to complete the self assessment. The workflow process included assigning two project managers: one from Engineering and one from Operations. These project managers then assigned 14 young professionals who were responsible for each of the self assessment topics. A minimum of three subject matter experts were assigned to each of the self assessment topics and the young professionals interviewed the subject matter experts and assisted in writing the report section on the specific self assessment topics. A steering committee made up of 5 senior level department managers met with the project managers every month to review progress. At multiple steering committee meetings, the young professional gave presentations to update the steering committee on their findings. Workshops were conduct to prioritize the self assessment topics that were not optimized and to review the recommended action plan. The self assessment included participation from over 75 individuals within DC Water. The self assessment interviews were completed in September 2016 with the draft report completed in January 2016. The report is anticipated to be submitted to the Partnership in February 2017. The self assessment process was fully embraced by the entire DC Water organization and enabled them to identify areas where they can improve. The use of young

professionals provided valuable insight an also served as a vehicle for knowledge transfer. This presentation will provide an overview of how DC Water implemented the PSW program.

Room 206 August 30th, 2017 3:30:00 PM to 4:00:00 PM

Presenter: George Rest, OBG

Presenter Email: restgb@obg.com

Title: Why are my Filters Failing? Forensic Analysis of Filter Underdrain Failures at WSSC's 285 MGD Potomac Water Filtration Plant

Abstract: Washington Suburban Sanitary Commission (WSSC) owns and operates the 285 MGD Potomac Water Filtration Plant (WFP), one of the largest water treatment facilities on the east coast. The WFP has experienced numerous failures of the filter underdrains, with the frequency of those failure increasing significantly over the past two years. An initial benchmarking survey found that similar failures had occurred at many other WFPs that had similar underdrain systems, but the causes of the failures varied, including excessive biogrowth, defective products, and methods of installation. This presentation will describe the failures and the approach used in a forensics analysis to determine the cause of the failures at Potomac WFP; the forensics included electron microscopy of failed underdrains, review of operating records, and installation of additional monitoring devices. The presentation will also describe the path forward, which involved a Business Case Analysis of alternatives for repair and replacement, and best practices to provide an early warning before failures occur in the future. Presentation will feature photographs of several failures, images from the forensic analysis, and photographs of new underdrains which are being installed on an expedited schedule.

Room 206 August 30th, 2017 4:00:00 PM to 4:30:00 PM

Presenter: Russell Ford, CH2M

Presenter Email: russell.ford@ch2m.com

Title: Ozone – AOP for Taste and Odor Removal along with Meeting Simultaneous Compliance Issues

Abstract: Ozone treatment was proposed at several water treatment plants (two in Singapore, one in New Jersey and one in New York) as a means of disinfection by-product control and to control taste and odor in the source water. Bench-scale testing was conducted at CH2M's Applied Sciences Lab to ascertain the demand/decay kinetics for ozone from these very different raw water sources to evaluate methylisoborneol (MIB) destruction and other emerging compounds uch as urea. The ozone testing results were used to provide design criteria for a new ozone facilities Raw water samples were collected to evaluate ozone demand and decay with varying water quality. The samples were pre-treated in the laboratory with aluminum sulfate enhanced coagulation using the current clarification system treatment conditions. Ozone demand and decay tests were conducted using a custom semi-batch technique, which mimics a typical full-scale bubble-diffuser contactor. The dissolved ozone residual and ozone offgas were monitored throughout the tests utilizing inline probes and a data logger, to develop ozone demand and decay curves. Samples were spiked with varying concentrations of bromide and MIB in order to evaluate bromate formation and MIB destruction with ozone treatment. A curve of MIB removal with ozone dose was generated at multiple initial MIB concentrations, geosmin concentrations with and without the addition of hydrogen peroxide. The effectiveness of the process leveled off after a certain point. The results indicate that AOP is more effective at MIB destruction, however, the reaction is also controlled by the raw water MIB as well as the hydrogen peroxide to ozone residual ratio. Approximately 90% reduction of the MIB compared to 65 percent reduction without AOP was achieved when the raw water sample contained approximately 90 ng/L of MIB. In the other case study the water was spiked up to 60 ng/L of MIB and was able to achieve MIB destruction to below 10 ng/L. In each instance, it was assumed that biological filtration would be able to achieve additional removal. Two of the plants will have more than 1 year of operating data by the time of the presentation. The water sources were spiked with bromide from 0.06 mg/L to 0.6 mg/L. The resulting bromate formation during ozonation ranged from less than 1 ug/L to 4.5 ug/L. The low bromate formation results can be attributed to the low pH of the water (pre-treated with enhanced coagulation), the presence of low levels of ammonia in the raw water, and the ability to quench the ozone residual rapidly after oxidation has been achieved. DBP formation potential tests on the ozonated water samples demonstrated TTHM and HAA5 formation, over the test incubation period, less than the regulatory limits (80 ug/L and 60 ug/L respectively). The bench-testing data was used to determine the design ozone dosing to achieve the required MIB and pathogen removal targets. This paper will present the bench-scale testing results, explain how they were used to develop design criteria and then where possible provide a comparison with the full-scale data.

Room 206 August 30th, 2017 4:30:00 PM to 5:00:00 PM
Presenter: Ana Morfesis, Malvern Instruments Inc
Presenter Email: ana.morfesis@malvern.com
Title: Water Treatment Operations and Optimal Coagulation Control
Abstract: Zeta potential has been successfully used in the water treatment industry for over a decade in order to determine coagulant dosages. Control of the clarification process and removal of natural organic matter remains one of the main challenges currently facing water utilities around the world, especially when changes in source water, weather events or equipment issues require rapid action in order to maintain stable floc formation. Zeta potential is a measure of the electrical potential between particles, and indicates the repulsive interaction between particles; a zero zeta potential means that the conditions for the aggregation of contaminants are maximized. This generally means a larger floc size and faster sedimentation rates occur during the time of the treatment process. Additional research however shows that neutralizing the charge all the way to zero is not necessarily required and might be cost prohibitive. Plant scale studies have shown that operating within the zeta potential range of -10 to +3mV minimizes contaminants measured by both turbidity and Total Organic Carbon (TOC) residuals. Optimization of chemical dose within this range offers a significant opportunity to reduce chemical use. Changes in particulate levels and TOC of raw water result in fluctuating demands for flocculating agents in water treatment facilities. A direct particle charge measurement, early in the process – right after the coagulant has been added and mixed, offers the opportunity for proactive response to changes in raw water conditions. The benefits of using zeta potential measurement to determine water treatment-control strategies have been documented through a number of case studies on full scale plants and will be reviewed. The case studies to be reviewed include conventional, direct filtration and hybrid water treatment facilities producing between 40 MGD to 180 MGD. Small changes in coagulant demand can be immediately identified as a shift in the zeta potential of the water in the process. The zeta potential results indicate nearly real time monitoring of changes in the plant allowing for improved operation stability. The example case studies also include facilities using a variety of coagulant chemistries including alum, ferric sulfate, ferric chloride and ACH along with cationic polymers. In all of these cases zeta potential accurately monitors the efficiency of charge neutralization process in order to enable precise coagulant addition. Specifically, on-line continuous process zeta potential monitoring benefits will be illustrated, by reporting on the experiences of a newly built hybrid facility, Tacoma Water a utility for WA and Aurora Water a utility for Aurora Colorado as well as other water treatment facilities in the US and UK will be discussed. As an example of the overall benefits, Aurora Water provides water for about 340,000 people in the Denver area. Results of on-line zeta potential results while monitoring the Aurora Wemlinger WTP will show the ability to reduce chemical coagulant usage costs and simplify process operation, leading to energy and other savings. The value of monitoring zeta potential on-line will also be demonstrated during plant startup of the new Tacoma Water GRFF hybrid plant.

Room 206 August 31st, 2017 8:30:00 AM to 9:00:00 AM
Presenter: Erik Michelsen, Anne Arundel County DPW
Presenter Email: pwmich20@aacounty.org
Title: Catalyzing Environmental Markets to Accelerate the Implementation of Chesapeake Bay Clean Water Goals: Lessons from Anne Arundel County's Full Delivery Pilot Project
Abstract: In 2016, Anne Arundel County issued its first solicitation for the "Full Delivery of Water Quality Improvement Projects," an effort aimed at incentivizing private sector engagement to help the County meets its clean water obligations under its MS4 permit and the Chesapeake Bay TMDL. This presentation will cover the rationale behind the initiative, the RFP development process, the solicitation process and response, the evaluation of proposals received, and the eventual award. Particular focus will be given to the technical breadth of the proposals as well as the relative cost effectiveness and timeliness of proposed projects as compared to those undertaken through the County's own capital improvement program.

Room 206 August 31st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Noelle Slater, Arcadis
Presenter Email: noelle.slater@arcadis.com
Title: TMDL Action Plans – Reflecting on the Past and Looking to the Future
Abstract: Over the last few years, municipalities, federal facilities and industries have been developing TMDL Action Plans as required by MS4 permits and industrial stormwater permits. Phase II MS4s were the first to fulfill this requirement, and had to do so with little to no guidance until late in the game. Chesapeake Bay and other TMDL Action Plans must include details of the permit-holder's current and future compliance strategies to meet the pollutant reductions required by the TMDLs in their permit. Phase I MS4s, selected Phase II MS4s, and selected industrial and federal facilities have already submitted TMDL Action Plans, and are well into the process of moving forward with implementing these plans. Now that the plans are in place…what are the lessons learned while developing TMDL Action Plans? This presentation will provide lessons learned from several municipalities, federal and industrial permit holders that have developed and are in the process of implementing TMDL Action Plans. The discussion will include prioritizing projects, funding strategies, credit calculation strategies, planning strategies, and regulatory guidance. TMDL Action Plans are living documents that are subject to change as compliance strategies, funding mechanisms and permit requirements change. One factor that can change the cost effectiveness of a project is a modification to the credit calculation methodology. This is especially an issue with stream restoration projects and BMPs that drain unregulated lands. For example, when a permittee redefines their service area based on more accurate mapping techniques, the TMDL reduction goals will change in accordance with their change in area but pollutant reduction credits achieved by individual BMPs may decrease due to the increase in the proportion of unregulated land in a BMP's drainage area. This presentation will discuss how adaptive management strategies should be used to facilitate long-term TMDL compliance.

Room 206 August 31st, 2017 9:30:00 AM to 10:00:00 AM
Presenter: Ryan O'Banion, Hazen and Sawyer
Presenter Email: robanion@hazenandsawyer.com
Title: Inspection of Stormwater Controls for Better Performance
Abstract: To comply with conditions of a VPDES Phase I MS4 Stormwater Discharge Permit, Fairfax County, Virginia, inspects approximately 20% of its inventory of privately maintained stormwater controls every year. In support of this permit condition, comprehensive inspections were conducted for more than 500 constructed stormwater facilities, representing a combination of green infrastructure practices and conventional stormwater controls. Inspection services are characterized by three phases: pre-inspection data collection, field inspections, and remediation and reporting. Hazen and Fairfax County worked together to compile the inspection reporting results into a database for analysis. Using this database, a number of key maintenance issues were consistently identified across the varying types of stormwater controls. Preliminary findings suggest that the most frequent maintenance items across the multitude of stormwater controls include: insufficient or incorrect vegetation, insufficient mulch layers, bare spots or erosion, and trash, sediment, or debris. This presentation will review the common maintenance items identified through a comprehensive inspection process and provide feedback to designers and maintenance professionals. This feedback will include suggestions for design and maintenance of stormwater controls to promote performance of the practices. Additionally, discussions of key inspection points and the use of new inspection technologies will be covered. For example, we will look at the results of a pilot study completed by Hazen and the County using 360° imagery as a tool for documenting the state of stormwater controls. This pilot established the level of effort required to use 360° technology and highlighted additional benefits for inspectors. These findings and inspection methodologies will help other inspectors, designers, and municipalities ensure stormwater controls continue to function as intended.

Room 206 August 31st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Erik Michelsen, Anne Arundel County DPW
Presenter Email: pwmich20@aacounty.org
Title: Innovative Program Management for Restoration and Retrofit
Abstract: Anne Arundel County has many competing land use demands and conditions that contribute to the complex stormwater and stream projects within the County. These complicated parameters include 500 miles of shoreline, 11,000 plus BMPs, Coastal Plain soil conditions, differing population densities, diverse land use, twelve primary watersheds, and hundreds of sub-watersheds that complicate our design parameters. To ensure the long-term success of our restoration efforts the Watershed Protection and Restoration Program (WPRP) has taken a holistic watershed approach to implement the goals identified within the program. Project Managers are assigned a specific watershed to develop their restoration efforts and community involvement. Because there is a finite amount of money to spend, the program has had to further adapt its efforts, enacting a cost effective, triage based approach. The ultimate goal is to provide high quality restoration projects that focus on long-term sustainable restoration and not just TMDL goal attainment. Because of the volume of work necessary to achieve these goals, we have standardized contracting mechanisms, created new ways to contract for both design and construction, and expanded the limits of existing contracting processes. Partnering with other local and State agencies (SHA, MDTA, MTA, and DNR) to share costs so more work can be completed before 2025. The program encourages the use of innovative engineering design, even when it presents challenges to permitting. To address challenges in the current permitting process; Anne Arundel County was instrumental in working with regulators to provide a new format for permit meetings. A Joint Permit Application meeting with MDE and the USACE held quarterly for unusual or innovative projects; streamlining the decision process by having the design team present their recommendations to the regulating decision makers at the agencies. This allows the County to gain regulator/design/owner group consensus. This can be a significant issue with competing resources on some of our projects. This interagency resources conflict can make it difficult to move forward with a design concept with clear direction, thereby extending the time and cost of permitting. The new joint meeting saves the County both time and the cost of putting forward two or more design alternatives for regulatory review. The program recognizes that all available treatment methods should be evaluated to address the County's restoration goals, but our new design process has put that decision at an earlier, more cost effective phase through the use of a concept memo instead of design alternatives in the schematic design development. Of particular challenge for retrofit designs are the new environmental site design (ESD) standards for stormwater treatment. Using ESD in retrofit projects is rarely cost effective or even possible on many sites. To maximize upland treatment, the program combines the use of "old school" structural design with innovative natural restoration for stream restoration in highly urbanized watersheds.

Room 206 August 31st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Viktor Hlas, Opti
Presenter Email: vhlas@optirtc.com
Title: Leveraging Continuous Monitoring and Adaptive Control (CMAC) Technology to Achieve Water Quality Objectives in the City of Lynchburg
Abstract: The City of Lynchburg (the City) has partnered with Opti to successfully implement an innovative solution that helps meet its water quality goals. This presentation will showcase results from the implementation of Continuous Monitoring and Adaptive Control (CMAC) technology at the existing Warren Avenue Stormwater Basin in the City. CMAC retrofits automatically control the discharge with an actuated valve based on real-time site conditions and weather forecast data. This cost-effective approach to stormwater management has provided the City with access to real-time data and insight into how its facilities function, optimizing the facilities for multiple environmental objectives and empowering stakeholders with the ability to adapt over time as regulations, land-use, and climate changes. An independent city in the James River watershed, Lynchburg is a major tributary of the Chesapeake Bay. The City is required to reduce 274 lb/yr of Total Nitrogen (TN), 65 lb/yr of Total Phosphorus (TP), and 29,289 lb/yr of Total Suspended Solids (TSS) by the end of MS4 Permit Cycle 1. The storm basin at Warren Avenue was selected as a pilot test site out of four candidate sites to install CMAC. The selection was based on the constructability, feasibility of conversion to Level 1 or Level 2 Virginia Department of Environmental Quality (VADEQ) Stormwater Design standards, ability to increase water quality treatment, repeatability, and representativeness of a typical CMAC installation. Initial calculations have projected that this retrofit would provide 41 treated acres and reductions of 440 lb-TN/yr, 53 lb-TP/yr, and 32,151 lb-TSS/yr. Recently approved and endorsed officially by the Chesapeake Bay Program as a means to obtain pollutant removal credits, CMAC represents a new and unique approach to managing stormwater, and has emerged as an alternative to passive stormwater management facilities. CMAC can more effectively use storage volume to increase retention time and minimize downstream erosive flows for channel protection. The innovative technique uses a water level sensor, an actuated valve, control panel, and cloud-based software to make automated, real-time control decisions based on National Weather Service forecast data. CMAC technology has achieved water quality, flood control, hydromodification, and water reuse objectives at over 130 sites across 21 US states. With this approach in mind, this presentation will provide attendees insight into: (a) The use of CMAC as a VADEQ-approved technique for the City to meet MS4 permit requirements at a lower cost and higher return as opposed to traditional retrofits. (b) Increasing water quality treatment of the pond at Warren Avenue by introducing an actively controlled water quality volume. (c) Validating benefits of the retrofit by collecting continuous hydraulic data after implementation of the CMAC technology. (d) Understanding the effort needed from the City's staff to deploy and maintain CMAC facilities to inform future investments. Continuous hydraulic data analysis from the pilot study will inform the future planning and implementation of real-time stormwater controls within the City's watershed.

Room 206 August 31st, 2017 11:30:00 AM to 12:00:00 PM
Presenter: Maura Carroll, Arcadis
Presenter Email: maura.carroll@arcadis.com
Title: Implementing MS4 Permits and TMDL Requirements: Lessons Learned and Innovative BMPs
Abstract: Communities across the U.S. are faced with meeting multiple regulatory requirements of the Clean Water Act, often while dealing with perennial budget struggles. With its location in the Chesapeake Bay watershed, Chesterfield County, VA is required to meet its stormwater MS4 permit requirements including a special condition to meet stringent Chesapeake Bay TMDL requirements. To address these requirements, the County developed a compliance plan that includes the preparation of watershed management plans, monitoring and inspection activities, and identification and design of cost-effective stormwater controls. Aligning Requirements and Accurately Delineating the MS4 Boundary. This presentation will describe how communities like Chesterfield County are aligning compliance requirements with other local needs to leverage funding and better utilize existing sites, and will describe an approach taken to accurately delineate the MS4 boundary and show the reduction in load requirements compared with the initial delineation that was based on urban Census data. To map the County's MS4 service area, the project team generated a network connecting the stormwater features and delineated contributing local drainage areas for each feature, then assigned ownership and service areas based on the corresponding feature. In addition to identifying areas draining to the County's MS4 service area, this process shows interconnections with other service areas. To automate this processing, the team developed a series of procedures using ESRI ArcMap and ModelBuilder. The presentation will describe the methodology and applicability in greater detail. Implementing Innovative BMPs to Reduce Compliance Costs. Most of the costs associated with the implementation of the County's compliance plan are being dedicated to the design and construction of BMPs, so the County is seeking to select BMPs that maximize pollutant reduction while minimizing costs. There are many types of repeatable BMPs that will work for typical situations, but innovation is required to overcome difficult site conditions, funding issues, or maintenance concerns, while also ensuring compliance with regulatory requirements. This presentation will use three case studies to illustrate innovative BMPs and lessons learned during design and construction. Case Study 1 - Outfall Retrofits. This retrofit design improves water quality and mitigates downstream erosion by diverting small storms, dissipating energy with an innovative design, and filtering and treating the stormwater. Tables illustrating pollutant load calculations, lessons learned during construction activities, and design improvements used in other projects will be described. Case Study 2 - Constructed Wetlands and Pond Retrofits. This retrofit converted three existing extended dry detention basins into enhanced BMPs. Innovations in the design included incorporating volume controls, detailed grading, and creative forebays. The case study also illustrates the steps required to retrofit old ponds constructed using outdated criteria. Case Study 3 – Reservoir Restoration. This project involves the restoration of a reservoir with a large, urbanized drainage area. The reservoir has lost significant volume due to sedimentation and does not meet current design criteria. Retrofit goals include volume augmentation and forebay construction. The process used to analyze sediment samples, calculate pollutant load reduction credits, and evaluate economic viability will be described.

Room 206 August 31st, 2017 2:00:00 PM to 2:30:00 PM
Presenter: Lisa Jeffrey, Hazen and Sawyer
Presenter Email: ljeffrey@hazenandsawyer.com
Title: Striking a Balance, Incorporating Water Quality into Drainage Improvement Projects
Abstract: James City County, like many other Phase II MS4 permit holders, is working diligently to improve water quality while also addressing citizen's more tangible concerns for drainage improvements and flood mitigation. The County understands that to meet the ultimate pollutant load reduction requirements of the Chesapeake Bay TMDL, they will need to incorporate water quality controls where possible. As a result, they have taken a proactive approach, incorporating water quality into a typical neighborhood drainage improvement project, demonstrating that every little effort counts and can be used to move the County towards water quality compliance. This presentation will provide a brief overview of the County's stormwater program and funding capacity, and then focus on recent efforts to incorporate water quality improvements into what would have previously been an exclusive drainage improvement project. By incorporating water quality improvements in each project where adequate benefit can be achieved, the County will be addressing both their regulatory and flood mitigation drivers, an approach that will likely be required to meet the long term requirements of the Chesapeake Bay TMDL and benefit from the cost-effectiveness of addressing multiple needs at once. The project showcased in this presentation is the retrofit of a neighborhood ditch system to improve drainage conditions while also incorporating water quality controls. The ditch system is undersized and has many common issues related to age and to lack of routine maintenance. Large sections of the ditch have become filled in and the culvert and drive pipes have become clogged, contributing towards localized and area-wide flooding with most storm events. Similar to many of the Phase II MS4s, the County has "right sized" their MS4 area and therefore has limited area for incorporating the water quality improvements required by the Chesapeake Bay TMDL. With foresight, the County will regrade and size the ditch system to carry appropriate design flow, thereby mitigating flooding, while incorporating bioswales, outfall improvements and educational BMPs to provide the pollutant load reductions.

Room 206 August 31st, 2017 2:30:00 PM to 3:00:00 PM
Presenter: Tim Schmitt, LimnoTech
Presenter Email: tschmitt@limno.com
Title: Updating BMP Databases in the District of Columbia and Anne Arundel County: Comparing and Contrasting the Data Needs and Goals of Two Local Governments

Abstract: Local governments in the Chesapeake Bay Region are required to plan for, implement, and report on Best Management Practices (BMPs) to reduce pollutant loads to help comply with the Chesapeake Bay TMDL. Typically, they have tracked BMP implementation through the engineering plan review permitting process, and developed tracking tools to store relevant information on the BMPs. However, in the current regulatory environment, many local governments are discovering they lack the high quality data they need to report on BMP implementation for receiving load reduction credits from permitting authorities. LimnoTech is working with the District Department of Energy and Environment (DOEE) and Anne Arundel County Department of Public Works to update BMP databases to provide the necessary data. In Anne Arundel County, LimnoTech is using multiple existing data sources to review and update existing stormwater BMP records and develop a comprehensive stormwater BMP database. This database will contain the complete and accurate urban stormwater BMP dataset for the County. The data derived from this dataset will be used to update the County assessment of managed versus unmanaged impervious area, to propose a new baseline of unmanaged impervious area of which a certain percentage must be managed/controlled within the life of the next permit, and to assess TMDL progress. Tasks under this project include reviewing electronic stormwater management plans and files to update and QA/QC information on BMP type, ownership, built date, and precipitation and water quality volume controlled; as well as developing BMP drainage areas in GIS. LimnoTech leveraged information in the files to calculate precipitation and water quality volume benefits when that information was missing; this will ensure that the County receives correct credit for its existing BMPs. This task was also important in light of MDE's evolving MS4 Annual Report geodatabase reporting requirements, which this database update will help fulfill. LimnoTech is also ensuring that BMP drainage areas do not overlap so that there is no double-counting of credit, and has developed a process to track BMP treatment trains. In the District, LimnoTech is refining an existing BMP database to ensure the information is adequate for credit reporting purposes. This includes identifying and updating missing data in order to credit existing BMPs that currently lack adequate information. LimnoTech utilized this BMP database in a pollutant loading tool to develop a Consolidated TMDL Implementation Plan for the District. Currently, LimnoTech is leading support to the District for correcting and refining the database so that it can be used to support inspection and reporting requirements. LimnoTech is also conducting those inspections. For both the District and Anne Arundel County, LimnoTech's work on these BMP databases supports multiple purposes, including BMP reporting for TMDL credit; inspection planning; and asset management. This presentation will describe the goals, requirements, and regulatory setting of the work for each government; summarize the tasks performed under each project; compare and contrast the final work products for each project; and finally, discuss the value of such work for moving forward in both compliance and asset management.

Room 206 August 31st, 2017 3:00:00 PM to 3:30:00 PM
Presenter: Leying Zhang, AECOM
Presenter Email: Leying.Zhang@aecom.com
Title: Meeting Evolving Stormwater Management Goals with Innovative Designs: Ashburton Water Tanks, City of Baltimore

Abstract: Current Maryland regulations require both water quality and quantity management to control stormwater from new and redevelopment projects. A project should provide Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP) prior to the use of structural Best Management Practices (BMPs). This presentation highlights stormwater design strategies to meet the required management goals for the Ashburton Reservoir Tanks Design project, located at Hanlon Park in Baltimore, MD. BMP type selection, placement, sizing, associated stormwater features design, and coordination among different disciplines will be covered during the presentation. Compliance with stormwater management (SWM) goals is complicated by the unique constraints of this project. The Ashburton tanks project is to design two buried concrete tanks, each with 434-foot diameter and 25 MGD storage volume, in replacement of the drinking water storage provided by the Ashburton Reservoir. The 26 acre Ashburton Reservoir was created through the construction of an earthen embankment in the early 1900s, on a highpoint of the City's west side. The project scale, geotechnical challenges, utility complications, compacted soils, steep slopes and high water table limit the type and location of stormwater management features allowed. In addition, the impervious areas are mostly sidewalks, pathways, playground and building that are spatially distributed across the park. Some of the proposed impervious areas are located right on top or next to the underground tanks. All these poses challenges to design, locate, and construct the stormwater features needed to treat all the impervious surfaces, while minimizing the impact to the buried tanks. A detailed site analysis was performed to identify and locate opportunities for providing stormwater treatment. This analysis included an in-depth assessment of site constraints and suitability for each BMP to ensure that stormwater management goals are achieved. In addition, the design successfully incorporated the Ashburton Reservoir as a large quantity control practices while also providing a water source to maintain lakes levels. The proposed design strategy is able to treat required impervious surfaces and provide adequate ESD volumes. It also addresses the stormwater quantity management aspect on recharge volumes and channel protection volumes, and controlling of the 10-year and the 100-year storm events. The presentation will focus on innovative stormwater designs as well as the coordinated effort between various disciplines vital to successfully meet the SWM goals. For example, landscaping changes and major utility locations will directly impact the location and size of the stormwater features. Design evolution through the Stormwater Management, Erosion and Sediment Control permitting through the City DPW will be discussed, as well as best practices learned throughout the overall design and permitting process.

Room 206 August 31st, 2017 4:00:00 PM to 4:30:00 PM
Presenter: Christina Alito, HDR
Presenter Email: christina.alito@hdrinc.com
Title: Identification and Remediation of Perfluorinated Compounds in Drinking Water
Abstract: Perfluorinated compounds (PFCs), also referred to as perfluorinated alkyl substances (PFASs), are a group of organofluorine chemicals which were previously integrated into a wide range of consumer products, including nonstick coatings, rain repellent clothes, and food packaging. In addition, PFCs have been used widely for aqueous film forming foam (firefighting), which can discharge into stormwater flows and subsequent treatment systems. These compounds are slow to degrade, very stable in water, and can persist in the human body for months or years. Negative health effects in humans, such as interference with endocrine, reproductive and immune systems, have been observed with increased exposure to high concentrations of PFCs. As a result, the U.S. Environmental Protection Agency (EPA) released a lifetime health advisory for two major PFC compounds, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), based on detrimental health effects to breastfed infants and fetuses during pregnancy. The lifetime health advisory recommends that finished water containing greater than 0.070 µg/L of PFOA and PFOS (individually or combined) be subject to further testing to limit potential exposure. To date there are no enforceable federal drinking water limits for PFCs but as the fate and contamination of these compounds continues to be researched, it is important to track the occurrence and potential treatment methods available for PFC removal. The objectives of this presentation are to provide current data on the prevalence of PFCs in Maryland public water systems and review the removal methods for remediating PFC contamination. PFCs can be categorized into two groups – long-chain (≥ 6 carbons) and short-chain (< 6 carbons) compounds. Generally, long-chain PFCs are more likely to persist in the environment due to their extensive structure with both hydrophilic and hydrophobic functional groups. Short-chain PFCs can be degradation products of long-chain PFCs or independently produced PFCs. Short-chain PFCs have been shown to be more unmanageable in water treatment systems due to their limited availability for adsorption. In the U.S., PFCs have been measured in source and finished water locations at ng/L levels or lower. Individual states, such as Vermont, Texas, North Carolina, New Jersey, and Nebraska, have begun to develop concentration guidelines for PFCs in varying water matrices. Data collected as part of the EPA's Unregulated Contaminant Monitoring Rule 3 (UCMR 3) nationwide detected PFCs above the lifetime health advisory for 0.3 and 0.9% of public water systems for PFOA and PFOS, respectively. Research is ongoing to determine the most efficient treatment methods for removal of PFCs, but initial studies have shown that advanced treatment techniques, such as activated carbon filtration, through granular activated carbon or powdered activated carbon, can remove up to 90% of PFOS and PFOA. High-pressure membrane filtration, such as reverse osmosis or nanofiltration, has also shown promising results with removal efficiencies up to 99% of PFOS and PFOA from drinking water. The information offered in this presentation will assist Maryland water utilities with monitoring PFCs in water and planning for treatment of PFC contaminations to avoid exceeding lifetime health advisories.

Room 206 August 31st, 2017 4:30:00 PM to 5:00:00 PM
Presenter: John Civardi, Mott MacDonald
Presenter Email: john.civardi@mottmac.com
Title: Cost Effectively Improving Distribution System Water Quality Using Chlorine Dioxide
Abstract: The Bristol Water Treatment Plant (BWTP), owned and operated by Aqua Pennsylvania, performed a full scale chlorine dioxide demonstration study to evaluate the effectiveness of chlorine dioxide as a pre-oxidant to improve water quality in the distribution system. The demonstration test achieved the project goals and Aqua is installing a permanent system. Aqua purchased the demonstration unit and will use the demonstration unit at other Aqua facilities. The BWTP has a capacity of 13 MGD and uses free chlorine applied to the filter influent for primary disinfection and manganese oxidation. Chloramination is used for secondary disinfection. Portions of the distribution system experience periods of low chlorine residual and the distribution system has shown evidence of nitrification. The use of filter top chlorine for manganese reduction has resulted in periods of elevated disinfection by-products. The primary goal of the study was to assess whether chlorine dioxide would provide a higher and more stable chlorine residual in the distribution system. A secondary goal was to determine if chlorine dioxide would reduce disinfection by-products. The study began in October 2015 and was completed in September 2016. Aqua is continuing the use of the demonstration unit until the permanent automated system is installed in the spring of 2017. The testing evaluated the impact of chlorine dioxide at three application points within the plant. Daily samples were taken at multiple locations within the plant and included: chlorine dioxide residual, chlorite residual and chlorate residual. Additional samples were taken periodically to measure generator efficiency and percent removal of TOC, DOC, UV254. Sampling in the distribution system generally consisted of monitoring 10 sites that represented low, medium and high water age. Distribution system sampling was performed approximately every two weeks and included analyses for free and total chlorine residual, nitrite, and disinfection by-products. This presentation will provide a discussion of the water quality issues at the plant, a description of the chlorine dioxide equipment used for the demonstration study, an overview of the testing protocol and a discussion of the results and findings from the testing program. The presentation will also provide an overview of the permanent automated chlorine dioxide system including: the type of generator, details regarding the sodium chlorite storage system, along with a discussion of equipment and operating costs.

Room 206 August 31st, 2017 5:00:00 PM to 5:30:00 PM
Presenter: Douglas Morton, RK&K
Presenter Email: dmorton@rkk.com
Title: Removing Arsenic from Groundwater at Calvert County's Marley Run Station
Abstract: This presentation will summarize the treatment upgrades to Calvert County's Marley Run Water System to remove arsenic from the groundwater. The 150,000 gpd capacity station pulls from two groundwater wells and provides potable water service for the Marley Run Subdivision. Over the past several years, arsenic levels in the groundwater were approaching close to the EPA's maximum contaminant level (MCL) limit of 10 ppb. As such, the County needed to devise a plan to reduce arsenic levels. The County consulted with Fluid Solutions, Inc to install an arsenic adsorption system (AAS) manufactured by AdEdge Water Technologies, LLC. The AAS is a premanufactured self-contained treatment process unit within a "Waterpod" shipping container that can be delivered and simply "plugged in" to the system with inlet and outlet water connections, along with electrical and communication connections. The AAS uses iron-based granular adsorption media Bayoxide E33 within pressure vessels through which the water passes. Due to the difficulty of no sanitary sewer service at the site, AdEdge also provided a backwash recycle system tank, filter, and pump to reuse most of the backwash water and greatly reduce disposal needs. The County hired RK&K to provide engineering design services for all aspects outside of the AAS itself. RK&K's role was to design the concrete slab upon which the AdEdge equipment would be placed, the external yard piping modifications necessary to connect the existing process flow to the new AAS, coordination with AdEdge, various site modifications, and the general integration of the AAS into the existing treatment system. This presentation will also discuss the arsenic removal performance of the AAS once treatment data is available. The project will be completed by Spring of 2017.

Room 206 September 1st, 2017 9:00:00 AM to 9:30:00 AM
Presenter: Jeremy Hise, Hazen and Sawyer
Presenter Email: jhise@hazenandsawyer.com
Title: Corrosion Control and the Impact that Coagulants Have – Balancing DBP Compliance with Lead and Copper Compliance
Abstract: Disinfection by-product (DBP) levels including total trihalomethanes (TTHMs) and five haloacetic acids (HAA5s) can vary due to seasonal changes in source water organic content, water treatment plant (WTP) and distribution system operations, seasonal temperature changes, and many other factors. These conditions can lead to moderate to high DBP concentrations in the distribution system. While switching to alternate coagulants can increase the removal of DBP precursors, those coagulants can have unintended consequences in the distribution system. Most pipes in the distribution system have layers of scale, which protect the pipe material against corrosion by water. These scales have been influenced by historical water quality and treatment changes and any disruption to these scales can leave the piping material prone to corrosion including lead and copper. While there are many interrelated factors impacting the rate and type of corrosion, in many cases the most significant factor is the chemistry of the finished water supply. Factors that influence corrosion include but not limited to pH, alkalinity, dissolved inorganic carbon, hardness, chloride to sulfate mass ratio (CSMR), disinfectant type and dose, dissolved oxygen level, phosphates, and trace metals. Since coagulants have a direct impact on the pH, alkalinity, DIC and CSMR, change in the coagulant type can influence the corrosivity of the finished water. The purpose of this study was to evaluate the effect of treatment process changes, especially coagulation, in relation to the Stage 2 DBP Rule and evaluate potential impacts on corrosion in the distribution system. Given that USEPA has recently published potential revisions to lead and copper rule (LCR), utilities are expected to maintain compliance with more stringent standards. In this study, bench-scale coagulant testing have been discussed. The results have been evaluated for their removal of DBP precursors (total organic carbon and UV254 absorbance) and potential effects on the corrosion of lead and copper. Bench-scale testing has been conducted to determine to optimum coagulation conditions for alum, acidified-alum, ferric chloride and ferric sulfate. Optimum coagulant doses were tested for effluent turbidity, pH, alkalinity, TOC and UV254 levels. A desktop evaluation was also conducted for these coagulants to assess their impacts on the corrosivity of the finished water. While a coagulant may have the highest DBP precursor removal, it was not recommended for implementation to avoid potential lead and copper corrosion in the distribution system. This study reveals the importance of the effects of treatment process changes on the corrosivity of finished water. While compliance with Stage 2 DBP Rule is essential, comprehensive evaluation of DBP precursor removal technologies should be evaluated to prevent unintended consequences with respect to lead and copper corrosion.

Room 206 September 1st, 2017 9:30:00 AM to 10:00:00 AM

Presenter: Douglas Morton, RK&K

Presenter Email: dmorton@rkk.com

Title: The Need for More Time: Settling and Disinfection Upgrades to Charles Town Water Treatment Plant

Abstract: This presentation will summarize upgrades to the 2.8 MGD Charles Town Water Treatment Plant (CTWTP) in Charles Town, WV in order to meet regulatory requirements on settling detention time and chlorine contact time. Constructed in 1990, the CTWTP draws from the Shenandoah River and is a conventional treatment plant with coagulation, flocculation, plate settling, media filtration, chlorine primary disinfection, and chloramine secondary disinfection for system residual. Although CTWTP's finished water quality was satisfactory and met all regulatory requirements, it had two regulatory violations on treatment technique parameters. Firstly, the existing plate settler basin had a detention time of only 34 minutes at plant capacity, compared to the State's requirement of 2 hours if using plate settlers, or 4 hours if not using plate settlers. Secondly, the existing clearwell was relatively small and provided a CT value (chlorine concentration x contact time) of only 19.2 min-mg/L under certain extreme conditions, whereas the EPA requires a CT value of 58 min-mg/L under these same conditions. The plant could normally meet disinfection requirements through various careful adjustments and by operating the plant under full capacity, but upgrades were required to allow the plant to comfortably meet disinfection requirements at full plant capacity. The major upgrades included: 1) the construction of a new flocculation basin and a larger plate settling basin meeting the State's requirement of 2 hours settling detention time, 2) the installation of solids collection equipment in the settling basin and the construction of a conventional gravity thickener to concentrate solids residuals from the settling basin, 3) the construction of a new 1 MG ground storage tank to exceed disinfection contact time requirements and provide extra storage in case of system emergencies, 4) the installation of transfer pumps to pump water from the existing clearwell to the proposed 1 MG tank, 5) the addition of a new high service pump station to pump water from the 1 MG tank to the distribution system, and 6) the installation of a new SCADA system for monitoring the various assets within the distribution system. The site layout and process were designed to allow future capacity expansion and a potential change from media filtration to membrane filtration. The plant upgrades are currently under construction and expect to be finished by May of 2017.

Room 206 September 1st, 2017 10:00:00 AM to 10:30:00 AM

Presenter: Joe Nattress, CH2M

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Title: How Big Does It Need to Be? - Analyzing Raw Water Data to Develop Design Basis for Solids Handling Facilities

Abstract: Numerous WTPs in the Northeast utilize rivers as sources for raw water to supply potable water to customers. At many run of river WTPs, peaks in river turbidity are mitigated in the WTP by the use of pre-sedimentation basins. Without pre-sedimentation, the high peaks in turbidity affect the entire WTP. For WTPs that have to handle, thicken, and dewater solids on-site, this can present a challenge to the sizing of those unit processes. This presentation will focus on how to examine raw water data, including peak events, to determine the best "design basis" for new or expanded residuals handling systems. Particular attention will be given to event frequency/duration and the raw water TSS/Turbidity ratio. Two case studies will be presented for water treatment plants in the Northeastern US on river sources to examine the impact on capital and operations of different approaches to the "design basis".

Room 206 September 1st, 2017 10:30:00 AM to 11:00:00 AM
Presenter: Andrew Thron, GHD Inc.
Presenter Email: andrew.thron@ghd.com
Title: Tough as Iron: Optimizing Water Treatment and Residual Recycle at Water Treatment Plants with High Levels of Iron
Abstract: The Broad Creek II Water Treatment Plant located in Annapolis, Maryland is a 4.0 Million Gallon per Day (MGD) facility that was recently expanded to treat 8.0 MGD of influent flow as part of a 2014 Expansion Project. Due to the high levels of iron in the groundwater, the WTP was designed to facilitate the conversion of soluble ferrous iron to insoluble ferric iron so that it can be removed. The 2014 Expansion Project consisted of a new 4.0 MGD liquid treatment train and a new residual handling system. The liquid treatment train component of the Expansion Project included aeration, rapid mixing/flocculation, chemical addition, clarification, and filtration. The residual handling system component of the Expansion Project included the conversion of the existing sludge transfer sump to a blend tank, conversion of the existing sludge holding tank to a residuals clarifier, and the construction of a new recycle pump station to discharge recycled flow ahead of the aerators. In 2015, GHD was contracted to perform a feasibility study on various unit processes of the existing WTP including rapid mixing, clarification, filtration, chemical addition, and the residual handling system. Although the majority of the feasibility study focused on the existing 4.0 MGD liquid treatment train, GHD was also asked to perform a detailed evaluation of the recently upgraded residual handling system. Upon start-up of the new residual handling system, the recycle flow introduced at the front of the plant significantly disrupted the sludge blanket in the clarifiers, causing large amounts of sludge to flow over the clarifier weirs and into the downstream filters. This resulted in the filters reaching terminal headloss at much faster rates, more residuals generation, and higher finished water TSS. Although GHD made initial attempts to optimize/modify the existing residual handling system so that it could function as designed, it was found that optimization of the existing system was infeasible for a number of reasons. First, the WTP has very limited residuals storage capacity. As a result, the recycle feed pumps must operate at an extremely high flow rate in order to avoid exceeding the storage volume of the facility. Although the recycle pumps are on VFD's and can be turned down, even the lowest recycle flow rate achievable is considerably high and would risk upsetting the clarifier sludge blanket. Further, operating at this lower flow rate would increase the time that must elapse between filter cell backwash cycles, complicating and extending the backwash process for operators. Finally, MDE requires that the recycle flow does not exceed 10% of the influent flow to a WTP. At the average daily flow and the lowest flow rate achievable with the existing backwash pumps, the Broad Creek II WTP recycle rate would be approximately 30% of the influent flow. Therefore, because of the limited storage of the facility, significantly oversized backwash pumps, and MDE requirements, a new residual handling system was recommended. This presentation will focus on GHD's detailed evaluation of the residual handling system and the associated liquid train upgrade recommendations.

Room 206 September 1st, 2017 11:00:00 AM to 11:30:00 AM
Presenter: Jamie Shambaugh, Gannett Fleming, Inc.
Presenter Email: jshambaugh@gfnet.com
Title: Optimizing Clearwell Performance – Lessons Learned from Computational Fluid Dynamics (CFD) Analyses and Tracer Testing
Abstract: Clearwell detention efficiency is important in obtaining the required disinfectant contact time (CT) to comply with regulatory requirements for disinfection. Although the baffle factor (BF) that represents clearwell efficiency can be critical to regulatory compliance, clearwell design is commonly accomplished using general design guidelines and "rules of thumb". Likewise, acceptable flow characteristics in other treatment basins and pump sumps are often assumed. Only after significant financial resources are expended to construct a clearwell or other hydraulic structure is it tested (typically by tracer testing) – frequently only to find that the performance is less efficient than the design intent. Although computational fluid dynamics (CFD) modeling has been available to the water industry for many years, and a 1999 AWWA Research Foundation project utilized CFD software to demonstrate the ability of basic models to predict hydraulic efficiency and establish general design guidance, CFD technology has been under-utilized as a design tool for clearwells, treatment facilities, pumps sumps, and other structures where flow characteristics are important. Computing power is now available to the water industry to allow very detailed CFD analyses to be utilized as a design and analytical tool. Although CFD analyses is often thought of as cost-prohibitive for all but the most complex hydraulic issues, these case studies will demonstrate how CFD analyses during design can provide cost savings by eliminating the need to retrofit tanks to correct inefficiencies and allowing tank size and configuration to be optimized to minimize construction cost. Costs savings can include eliminating re-design and permitting, multiple tracer tests, and costs associated with delays while inefficiencies discovered during tracer testing are investigated and corrected. Long-term costs associated with process inefficiency, degraded process performance, increased DBP formation, and restricted operating capabilities and flexibility can be avoided by using CFD during design. CFD analyses can also save considerable capital cost by eliminating over-designed structures (excess baffling) and avoiding over-sizing a tank for CT purposes due to low anticipated efficiency. This work includes a discussion of the application of CFD analyses to the design and retrofit of clearwells, tanks, and other hydraulic structures and includes several case studies – each demonstrating a unique design issue that results in inefficiencies. Case studies include tracer study results, CFD model results demonstrating issues causing inefficiency, and the results of corrective actions determined using CFD modeling and other approaches. In addition to demonstrating the benefits of using CFD analyses, including cost effectiveness, the lessons-learned will provide the listener with guidelines to improve future designs, regardless of whether CFD analysis is employed.
