Topic Track: Collaborative Delivery

Date: Monday - 9/11/23

Time: 10:30 - 11:30

A New Wastewater System from Scratch—Port Hadlock, Washington

Summary: This presentation will detail the key challenges Jefferson County faced in constructing a completely new wastewater treatment plant and collection system. Attendees will gain knowledge of strategies for implementing a large project involving multiple grant funding agencies, as well as bidding strategies for an inflationary climate.

Abstract:

Jefferson County, Washington, is implementing a new sewer utility and constructing a sewer system in the unincorporated area of Port Hadlock, south of the City of Port Townsend. Port Hadlock is a moderately developed rural area that is currently served by on-site septic systems. Jefferson County has worked diligently with the community and with funding partners to develop an affordable project at a sensible scale to provide a financially sustainable wastewater system that meets community needs.

Topics that will be discussed:

- Value Engineering—This project implemented value engineering recommendations to include updated planning requirements and industry advances in modular MBR treatment processes to accommodate “just-in-time” implementation of current and future treatment capacity.

- Equipment Vendor Selection—Jefferson County pre-selected an MBR vendor and contracted a price in advance of construction. This process included a scope of work for vendor design services, flow and treatment design criteria, system expansion requirements, and pricing.

- Construction Contracting Strategy—Jefferson County broke the work into several contracts and phases to ensure bidding opportunities for contractors, to attract bids from local and regional contractors, to ensure competitive bids, and to track and manage the spending of grant funds from several funding sources more efficiently. The project was divided into four contract bid packages: Treatment Plant Site/Civil, Treatment Plant Construction, Pressure Sewer Collection System, and On-Site Grinder Pump Installation.

- Results—The Treatment Plant Site/Civil contract is bidding in March of 2023 and will be under construction by June 2023. By September of 2023, Jefferson County expects to have the Treatment Plant Construction and Pressure Sewer Collection System contracts bid and construction under way. The presentation will describe the status of construction and lessons learned on the processes to get construction initiated.

Presenters

Kevin J. Dour, PE, PMP

Sr. Project Manager

Tetra Tech, Inc.

Kevin Dour, PE, PMP is a senior civil-mechanical engineer who has managed projects ranging in size from task orders under $5,000 to complex projects with $29M in construction cost and multi-millions in engineering costs. He has led large projects involving multiple subconsultants that required controlling budget and schedule for concurrent tasks with tight deadlines imposed by emergency conditions and permitting and funding considerations. Kevin has extensive experience with facility planning and engineering design projects requiring creative development and rigorous evaluation of alternatives. He has the communication skills and temperament needed to facilitate discussions among consultant and client staff as well as translating engineering principles and solutions into concepts understood by a non-technical audience.

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Seattle, WA

Eric J. Dienst, PE

Design Engineer

Tetra Tech, Inc.

Eric has nine years of experience with the study, design, and construction management of wastewater/stormwater treatment and collection facilities. Eric has served as the lead project engineer for a $250 million wastewater treatment plant upgrade in Binghamton, New York. His experience includes wastewater treatment system design, development of technical specifications and reports, and internal and external coordination of clients for large-scale projects. Eric also has experience developing technical memorandums for the optimization of process chemicals and other wastewater treatment plant unit process.

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Seattle, WA

Topic Track: Collaborative Delivery

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Avoiding Pre-procurement Pitfalls

As we've come out of the COVID era, supply chain shortages for many types of materials, equipment, and labor have persisted, increasing the likelihood that your equipment will be significantly delayed, creating missed deadlines and challenging construction. In order to avoid these pitfalls resulting from expected and unexpected long lead times, early procurement has become more critical than ever. Alternative delivery methods such as design-build and CMGC are one way to perform early procurement. However, many owners are unwilling to go to alternative delivery creating a need for a more aggressive pre-procurement strategy for conventional design and delivery (design-bid-build) process. Pre-purchases under conventional delivery are often more challenging than for alternative delivery, adding risks to owners and design engineers. This presentation will identify some of the issues we currently face when taking on pre-procurement, review lessons learned from the good and bad case studies and propose some strategies to increase certainty, reduce delays, maximize the likelihood of a quality product and minimize the risk of pre-procurement.

Presenters

Nick Smith, PE

Principal Project Manager

Stantec Consulting Services Inc.

Mr. Nick Smith is a licenced principal engineer out of the Boise, ID Stantec office. His 23 years of experience includes planning, designing, managing and performing construction management services for water treatment and water conveyance systems throughout the western United States and especially Idaho. Mr. Smith focuses on managing wastewater treatment and alternative delivery projects. Nick's dual education path included a finance degree with University of Oregon followed by an Environmental Engineering degree from Oregon State University. Nick enjoys outdoor activities including hunting, cycling, tennis and spending time with family and friends.

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Boise, ID

Topic Track: Collaborative Delivery

Date: Monday - 9/11/23

Time: 13:15 - 14:15

Design, Bid, Build vs Guaranteed Max Cost Design Build (pros & Cons)

Beginning in late 2014 and into 2015, the City of North Bend, WA invested nearly $3 million in emergency repairs at the aging Wastewater Treatment Plant (WWTP). In response, the City commissioned a comprehensive study to determine the full scope of long-term improvements that were needed at the antiquated 1950s era WWTP. Unfortunately, years of deferred upgrades - dating back to the 1980s - had caught up with the WWTP. In 2016 it was determined that to bring the near failing WWTP up to current safety and environmental standards, as well as add redundancy and capacity. The City started work on HPI Phase I in 2019 through the traditional design bid build process and completed this phase near the end of 2021.

When it was time to think about moving forward with HPI Phase 2, the City was considering alternative delivery methods due to the instability of the bidding market at the time. In turn, the City reached out to Trane to learn more about the process they had been utilizing to assist other local municipalities with their wastewater treatment plant upgrades. HPI Phase II began via a design build process in 2020, with a guaranteed maximum cost and guaranteed energy savings from installing high efficiency equipment.

This presentation will outline two projects that were completed through two different procurement methods, the ups and downs that each project has encountered, and how they were handled in each case. Trane will provide the perspective of the prime contractor for phase 2, working under a guaranteed maximum cost during the highest inflation periods that our area has seen in history, labor disputes, design, and construction challenges, etc. The City of North Bend will present their experience with Phase I compared to phase II from the City's perspective.

Presenters

Mark Rigos

Public Works Director

Clean water is one of my passions. I've always had an affinity for clean water, which makes sense since I was born and raised in Seattle. My education includes undergrad degrees in Civil Engineering and Biology,and a Masters degree in Business Administration. I'm a licensed Professional Engineer, and while working for several consultant firms, I engineered hundreds of storm drainage, water and wastewater systems for many projects throughout the Puget Sound Basin. My more recent experience was Public Works Director for City of Newcastle and now Public Works Director for City of North Bend. At North Bend, I'm responsible for utilities oversight. When I arrived at North Bend in 2014, I saw a declining WWTP that was under-sized, out-dated, and out-of-compliance. Since then, the City has made huge strides investing $56 million into our WWTP. This design / build procurement is the culmination of those efforts.

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North Bend, WA

Angie Estey

Senior Account Executive

Trane

Angie has been with Trane for 12 years and has been working with municipalities to upgrade wastewater treatment plants through an alternative procurement vehicle for 11 of those years. She has completed over 26 projects, assisting each client with securing grants, utility incentives, and maximizing energy and operational savings. As well as maximizing opportunities to install alternative energy sources and bring each client closer to meeting the new WA state electrification goals.

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North Bend, WA

Topic Track: Collaborative Delivery

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Progressive Design-build Procurement Tools for First Timers

As owners small and large grapple with generational infrastructure projects to respond to climate change impacts, deteriorated infrastructure and increasingly stringent regulations, more and more are looking to Progressive Design-Build (PDB) as the delivery model of choice. A well-planned, transparent, and organized procurement process rooted in the owner's priorities and drivers is critical to setting the stage for successful PDB delivery. For those new to PDB, or those who use it infrequently, getting started is daunting; the need for immediate and practical guidance has never been more important. The Water Collaborative Delivery Association (WCDA, formerly the Water Design Build Council) has recently revamped its PDB Procurement Guide, which provides owners with user-friendly RFQ and RFP templates for use as well as advice on how to procure the right PDB delivery partner.

This presentation will provide an overview of the WCDA PDB Procurement Guide and discuss specific activities and best practices to procure a PDB delivery partner, including:

- Appropriate timing of procurement and market engagement activities

- The importance of early development and disclosure of contract terms and risk allocation and providing opportunities for market feedback

- How to tailor RFQ and RFP requirements to match owner goals and objectives

Learning Objectives:

- Understand how early market engagement, tailored RFQ and RFP requirements and confidential meetings increase the likelihood that owners select the delivery partner best suited to tackle their specific project challenges.

- Define the value of securing proposer input on draft contract and commercial terms in establishing a balanced contract and fair allocation of risk – which is critical to setting the stage for successful PDB execution

- Discuss how to incorporate request for pricing information in a way that produces apples-to-apples submissions from Proposers and supports successful project execution.

- Understand what tools exist to support development of quality RFQ and RFP documents

Presenters

Michelle Green

West DB Lead

Jacobs

Michelle Green, PE, DBIA, leads the design-build business for Jacobs' Water Market in the Western US, building on a career of delivering successful water and wastewater projects. She regularly leads progressive and fixed-price design-build projects, has led design services for construction management at-risk (CMAR)projects, and provided owner advisor services for both CMAR and progressive design-build projects. Michelle is also the incoming president for the Water Collaborative Delivery Association

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Portland

Topic Track: Wastewater Digestion

Date: Monday - 9/11/23

Time: 15:30 - 16:00

Alternative Indicators of Stability and Capacity of Full-Scale Digesters in Operation

Anaerobic digesters are typically operated with limited process information and rely on industry standard values and long detention times to minimize the impact of any perturbations. Understanding the risk of failure is particularly important when these are operated under variable loading conditions or close to their design capacity. Our ability to identify the causes of upset events and remedy them, is affected by the limited number of online parameters that can be used to characterize digestion performance, the restricted ability to make visual inspections, and the use of laboratory measurements that can sometimes be unreliable and take time to be completed.

Over the previous years, Clean Water Services has developed and implemented a bioassay to monitor the digesters of the Durham and Rock Creek Water Resource Recovery Facilities to better understand digestion performance and health as it relates to capacity. The bioassay consists of measuring the ability of the microbial communities to use a key intermediate over time, such as acetate, and can help identify conditions of stress caused by organic or hydraulic overloading. The indicators generated can provide a unique insight about operational strategies that help maintain stability. This bioassay has been proven to be reproducible, relatively easy to implement, and it can generate indicators of digestion health within 12 hours.

The experimental development of the bioassay and initial results were presented at the Pacific Northwest Clean Water Association Conference in 2022. This presentation will include an evaluation of the bioassay indicators against conventional full-scale operation metrics and will focus on addressing the following questions:

- What are some of the challenges CWS has had using traditional metrics to identify unstable conditions?
- What are some of the insights that have been generated from using the bioassay over the past year of operation?
- How can these indicators enhance the information provided by conventional metrics?

Presenters

Ornella Sosa Hernandez

PhD

Clean Water Services

Ornella Sosa-Hernandez is an Operations Analyst in the Technology Development and Research group at Clean Water Services. She received her Ph.D. of Science and Engineering from the Monterrey Institute of

Technology and Higher Education in Mexico specializing in Environmental Systems after obtaining a Bachelor of Science in Biotechnology Engineering.

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Tigard, Oregon

Topic Track: Wastewater Digestion

Date: Monday - 9/11/23

Time: 16:00 - 16:30

CFD Unlocks Internal Details of Digester Mixing

During water resource recovery, end process solids are commonly stabilized in Anaerobic digesters utilizing bacteria to convert organic materials to biosolids and biogas, both having beneficial uses. The digestion process runs optimally with near uniform conditions, requiring complete mixing of digester contents with minimal short-circuiting and maintaining contact between the tank active biomass and incoming feed. Mixing efficiency is assessed post construction through tracer testing, and measurement of temperature and solids profiles. Industry has reported similar levels of mixing for a wide range of power inputs and types of mixing systems. Oversized mixing systems lead to high construction and operating costs, while under-sized system lead to subpar performance. Understanding mixing in a more fundamental way can reduce costs while delivering desired performance aiding in design of right-size mixing systems that reduce energy consumption while maximizing biogas production and organics destruction. In addition, newer types of mixers have entered the market that may have high efficiencies – understanding actual mixing provided by systems allows designers and utilities to compare technologies, determine the limits of mixing innovation, and ultimately select the best solution that balances cost, performance, and risk. A recent new installation used different mixing technologies and included detailed startup testing, providing ideal data for developing computational fluid dynamics (CFD) modeling approaches to study internal mixing details.

CFD is a promising tool to optimize mixing system selection and design, as it allows us to “see” inside the tank, visualize the mixing, identify dead spots or areas of over-mixing, and provide an easy platform to customize and compare different technologies or designs. Development of CFD models for different types of mixing systems and comparison of model outputs to actual field-produced data could allow for refinement of this tool and for expanded use in digester system design and optimization. This talk will focus on the development of CFD modeling approaches for evaluating digester mixing. Key physics will be reviewed. Model results will be presented comparing model simulate mixing with field measurements.

Presenters

Ed Wicklein

Chief Technologist - CFD Modeling

Carollo Engineers, Inc.

ED WICKLEIN has 25 years of experience in design and analysis of hydraulic facilities using numerical models. He has conducted thousands of CFD studies to support design and operation of municipal and industrial water and wastewater facilities. Through these efforts he has modeled most of the major treatment components and processes. He is actively involved in both the Hydraulic Institute and the IWA

Working Group on CFD Modeling. He lead or co-author of four chapters of the International Water Association book “CFD Modeling for Wastewater Treatment Processes”.

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Seattle, Washington

Topic Track: Wastewater Digestion

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Anaerobic Digester Startup Best Practices, with a Case Study

Anaerobic digesters are the most common solids stabilization technology in municipal wastewater treatment facilities. Although they are relatively low maintenance, routine cleaning every 5-10 years helps maximize performance and prolongs the useful life of the tank. However, restarting a digester is a complex process requiring careful oversight and detailed knowledge of the plant processes. This presentation will cover best engineering practices for taking a digester out of service and restarting the process safely and efficiently. Stopping and restarting a digester require careful coordination of digester gas, mechanical processes, solids management protocol, and digester biological health. Specific procedures vary depending on the presence of other operating digesters, fixed vs floating covers, the type and quality of solids produced at the facility, and other factors. Step-by-step instructions for managing digester maintenance will be provided, along with a case study of a recent digester startup.

The Grant's Pass Wastewater Treatment Plant in Oregon recently restarted their digester using seed sludge from a nearby wastewater treatment facility. The startup presented several challenges, including concurrent upgrades to the digester heating system, cold weather, and a floating cover digester. To maintain safety, a water seal was formed using primary effluent and seed sludge was added to the digester in batches over a two-week period. A temporary recuperative thickening process was installed to expedite the startup process. Key digester health parameters such as digester gas production, digester gas characteristics, volatile acids, alkalinity, etc. were tracked to guide the startup process.

Presenters

Nathaniel (Nate) Janega

Civil P.E. Focused on Wastewater Reclamation and Energy Recovery

Carollo Engineers

Nate Janega P.E., wastewater engineer, and biogas enthusiast at Carollo Engineers. Nate has 6 years of design and project management experience in industry, and volunteers with Mt. Everest Biogas Project, and the EPA's Cold/High Altitude Anaerobic Digester group.

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Seattle

Topic Track: Treatment

Date: Monday - 9/11/23

Time: 10:30 - 11:30

Dialing in Regulatory Compliance and Cost-Effectiveness for CEPT

The Portland Bureau of Environmental Services (BES) Columbia Boulevard Wastewater Treatment Plant (CBWT) practices CEPT during wet weather events to increase settling performance in the plant's wet weather clarifiers (WWCLs). Wet-weather flows dilute the alkalinity of the plant influent such that ferric chloride (FeCl3) addition results in a decreased effluent pH. During the summer of 2020, the NPDES permit was updated to require continuous monitoring of pH limits between a daily minimum of 6.0 and a daily maximum of 9.0. With continuous monitoring in lieu of grab samples, BES has observed pH violations when CEPT is practiced which is believed to be due to the coagulant, ferric chloride. The objective of this project is to determine an alternative CEPT chemical or the addition of post-coagulation pH adjustment to prevent future permit violations for pH.

An investigation occurred to trial different polyaluminum chloride (PACl) based coagulants to limit pH decrease. The investigation included vendor outreach for coagulant candidates, jar testing, and full-scale pilot testing during dry weather events (with wet-weather event pilot tests anticipated) trialing multiple coagulants, as well testing the use of post-coagulant chemical addition for pH adjustment and buffering. This presentation will present and reflect upon the results showing that PACl coagulants are effective, but products differ significantly in cost effectiveness. It will also discuss the challenges during and approaches to the project including pandemic associated variables such as unstable costs, unreliable chemical availability, and labor shortages.

A potential secondary use of the CEPT system is to pre-treat wastewater to reduce loading to the secondary treatment system. BES also tested the performance of dry weather clarifier (DWCL) CEPT to determine the effectiveness at reducing aeration basin loading to provide a solution for growth projections with limited space for expansion. Results from a 2022 full-scale pilot and lessons learned will be presented.

Attendees will gain an understanding of the technical engineering involved in evaluating alternatives to prevent the pH excursions, as well as the creative problem-solving and collaborative effort between all parties that will lead to an updated CEPT process that benefited both the wet and dry weather treatment processes.

Presenters

Heather McKenna

Engineer III

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Puyallup, WA

Topic Track: Treatment

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Using Augmented Dry Weather Flows for Performance Testing of a new Satellite Wet Weather Treatment Station

After five years of related construction activity, King County's Georgetown Wet Weather Treatment Station (GWWTS) began treating combined sewage in December 2022 that would have otherwise been released into the Duwamish River in Seattle. The station was designed to control combined sewer overflows at the South Michigan and Brandon Street outfalls by limiting untreated discharges to an average of no more than one per year, per outfall. The GWWTS has a capacity for a peak inflow of 133 mgd. The station includes a 1.1 MG equalization basin and two 35-mgd treatment trains that use ballasted sedimentation and ultraviolet disinfection to meet discharge permit requirements. Additionally, the GWWTS includes a regulator, screening and handling, influent pump station, chemical storage and distribution, odor control and solids storage systems. During the wet weather season, the station is ready to quickly startup and treat intermittent and variable events on short notice. Startup and shutdown sequences between events consist of a recycle stream, solids discharge, water management, and tank flushing. During dry weather, the station can recycle treated water to allow for operator training, maintenance, and inspection.

The presentation will review the station's features and discuss operational testing that was performed before commissioning. After testing individual systems in isolation, additional testing was conducted to ensure full integration and that the station operated as intended. During the first part of operational testing, the station was hydraulically tested using City water. In the second part, dry weather flow from the conveyance system was mixed with potable water to simulate the combined sewage the station would treat during a wet weather event. Rather than being discharged, treated water was recirculated, but otherwise the station operated as it would during a wet weather event. With coordination and support from the manufacturers, the performance of the ballasted sedimentation and UV disinfection systems was tested by sampling influent and effluent flows, with a third-party lab analyzing the samples.

Presenters

Ryan Dunne

Professional Associate

Jacobs

Ryan Dunne is a Professional Associate in the Infrastructure and Advanced Facilities group at Jacobs. He received a bachelor's degree in Water Resources Engineering from Humboldt State University. His seven years of experience includes Green Stormwater Infrastructure (GSI) design and conveyance system modeling to reduce combined system overflows. Ryan supported civil site design and has provided

construction support over the last three years as a Field Engineer and Deputy Project Manager at the Georgetown Wet Weather Treatment Station.

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Duvall, WA

Topic Track: Wastewater Treatment

Date: Monday - 9/11/23

Time: 13:15 - 14:15

Digital Twins for WWTPs

Digital Twins for WWTPs are live, automated process models running hourly with new data from the plant. They can predict the future, assess instruments, recommend control strategies, and be used to evaluate scenarios with high load, tanks down for maintenance, or anything the user can dream up! Through two case stories and a live demonstration, we'll discuss the advantages of digital tools for meeting energy and cost saving targets and upskilling operations staff, and evaluate shortcomings based on the current state of digital twins and sensors for process control with automated calibration.

Presenters

Ryan Sanford

Senior Wastewater Engineer

DHI Water & Environment, Inc.

Ryan works as a professional engineer with a mission of optimizing wastewater treatment plants without building new infrastructure. With over 10 years of process engineering and operations support engineering experience, demonstrated expertise in WEST process modeling, TwinPlant controller design, and wastewater process design and optimization, Ryan partners with a global team of wastewater treatment experts at DHI to find the right solution for US-clients.

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Leadville, CO

Topic Track: Wastewater Treatment

Date: Monday - 9/11/23

Time: 14:15 - 15:15

"Operator, Could You Help Me Make this Call" - Operations and Maintenance Staff Optimize Wastewater Treatment Plant Design with Invaluable Field Experience

Traditional wastewater treatment plant design typically did not solicit the input of Operations & Maintenance (O&M) staff. However, over the last two decades engineers have come to realize the communal experience held by O&M staff. Their daily exposure to performance and reliability issues generates specialized knowledge that many engineers do not possess. O&M staff input can lead to more operable, more dependable, and therefore more efficient and cost-effective plants. Today, O&M staff integration into the planning, design, and construction of wastewater projects is a key component to their success. O&M staff should be giving ample opportunity to provide input throughout a project's development and be a key voice in the decision-making process to ensure wastewater treatment plants are easy to operate and maintain. Engaging O&M staff early helps engineers understand the nuances of specific plant operations which can be the difference between a good design and a great design Finally, including plant O&M staff in the design of any wastewater treatment project creates a sense of ownership and pride the will be transferred to future staff for years to come. This has never been more present than during the design and construction of the Secondary Treatment Expansion Program (STEP) at the Columbia Boulevard Wastewater Treatment Plant. Starting during conceptual design, plant O&M staff have actively engaged in workshops, campouts, field investigations, documentation review, and the decision-making process. Their input to the project has been invaluable and is a key component to its success. This presentation will encourage audience participation by pulling the audience to the front of the room, incorporating a short icebreaker, asking stimulating questions, and adding a touch of humor. A goal of this feel-good presentation is to give homage to plant operations and maintenance staff everywhere for their continuous efforts in the field to keep our WWTPs running and recognizing the knowledge and often creative solutions they bring to the drawing board.

Presenters

Randy Mueller

Project Manager

Jacobs Engineering Group

Randy Mueller is a project manager with Jacobs Engineering Group in Portland, Oregon. Randy has been working in the field of engineering for more than 20 years with a focus on water and wastewater projects from planning and design all the way through to construction and commissioning. He is a licensed professional engineer in Oregon and Washington and also a Project Manangement Professional. Randy has degrees in environmental engineering, mechanical engineering, biology, and secondary education.

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Topic Track: Wastewater Treatment

Date: Monday - 9/11/23

Time: 15:30 - 16:00

Evaluation of Mechanisms for Enhanced Reduction of Effluent Copper at Trace Levels

The toxicity of copper depends on complex water chemistry interactions. Water bodies with low ionic strength, organic carbon, and pH can have relatively low copper water quality criteria, resulting in associated low effluent limits for water resource recovery facilities (WRRFs) discharging to them. The Forest Grove WRRF faces low effluent copper targets owing to the water quality characteristics of its receiving stream. Clean Water Services (CWS), which operates the WRRF, conducted a study examining opportunities through source control, design, and operations to ensure that discharges have no reasonable potential to contribute to a water quality standards exceedance.

Further reducing WRRF effluent copper at low levels is challenging and some mechanisms are not well understood. Approaches explored at various facilities have included decreasing loadings from the collection system, solids retention time adjustment, chemically enhanced primary treatment, pH control, and use of targeted chemical precipitants in secondary clarification.

In this study, researchers analyzed historic operational data and conducted full-scale sampling, bench testing, and pilot testing. A ten-year dataset was reviewed to analyze and compare removal efficiencies in different treatment processes at the four WRRFs operated by CWS. Copper loading data was evaluated to determine the potential impact of enhanced source control on influent and effluent copper. Additional sampling was carried out to study primary and secondary treatment copper removal during high flow events and to characterize concentrations in mixed liquor suspended solids. A full-scale pilot test of effluent pH control was conducted to determine the impact on copper toxicity thresholds calculated via the Biotic Ligand Model. In addition to full-scale monitoring, jar tests were conducted with a variety of chemicals to evaluate the potential for chemical addition to enhance removal of dissolved and particulate copper in primary and secondary clarification. A series of trials were also run using settling columns to compare copper removal between bench and full scale and to estimate the copper removal performance of future clarifiers at a range of surface overflow rates.

This presentation will discuss full-scale and bench-scale findings and the resulting multi-pronged approach being pursued for effluent copper management.

Presenters

Leila Barker

Senior Engineer

Clean Water Services

Leila Barker is a Senior Engineer in the Technology Development and Research group at Clean Water Services. She has an M.S. in Environmental Engineering from Oregon State University and a B.S. in Biology and Music (Violin Performance) from Emory University.

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Tigard, Oregon

Topic Track: Wastewater Treatment

Date: Monday - 9/11/23

Time: 16:00 - 16:30

Modern Trickling Filters Solutions for the 21st Century

Trickling filters have been used in wastewater treatment for more than 120 years and has evolved into a modern solution to meet today's wastewater treatment needs. Major changes including introduction of lightweight, high-surface-area plastic media and speed control distribution have significantly improved the treatment efficiency of trickling filters. Yet with all these changes, there has been little increased understanding of the added capability provided by TFs. Information from design engineers and end users on trickling filter improvements has been largely unrecognized or poorly reported. Myths of trickling filters may have influence design engineers. This presentation provides an comprehensive overview of the major changes of trickling filter design and clarifies the common misconceptions and myths about trickling filter technology.

This presentation also discusses energy efficiency and carbon footprint based on an extensive literature review. Energy consumptions data from several wastewater treatment plants in the states of Hawaii, Washington, Virginia and Georgia with different biological treatment technologies will also be summarized and analyzed.

An innovative trickling filter system will also be introduced in the presentation. Bethel Park wastewater treatment plant in Pittsburg area, Pennsylvania has two trickling filters in series, which were retrofitted from the original rock filters. Significantly improvement of nitrification has been observed since the retrofit in 2010. Annual average ammonia-N concentration in the effluent has been consistently less than 1 mg/L. A high level of nitrification can be achieved at an ambient temperature of 0 ◦F. The improved nitrification performance can be attributed to the improved oxygen transfer and heat retention features of the system. Dissolved oxygen (DO) in the trickling filter system effluent has consistently been close to saturation or oversaturation. The DO-rich environment promotes nitrifier growth and results in a higher level of nitrification.

Modern trickling filters are environmentally friendly and reliable biological treatment systems that should be given full consideration in 21st century wastewater treatment plant design. With proper engineering, operation, and maintenance, trickling filters can provide many years of simple, effective, and low-cost treatment.

Presenters

Julia Zhu

P.E., Product Line Manager

Brentwood Industries, Inc.

Julia Zhu is the Product Line Manager for Brentwood's biological treatment systems. She has been with Brentwood for 12 years working on process modeling, research and development and project

implementation. Prior to Brentwood, she worked as a consulting engineer and was involved in several wastewater treatment plants design. She has multiple publications regarding biofilm reactors on peer reviewed journals, WEFTEC proceedings and industry magazines. Her diverse experience has equipped her with deep understanding of industry products and applications, particularly those related to trickling filters and integrated fixed film-activated sludge (IFAS) systems.

Julia holds a Master of Science in Bioengineering, with concentration in wastewater engineering, from University of Hawaii at Manoa. She is a licensed professional civil engineer in State of Hawaii.

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Reading, PA

Topic Track: Wastewater Treatment

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Filtering Through Different Tertiary Treatment Technologies

This presentation will examine the use of disc filters, continuous backwash granular media filters, and compressible media filters at three different facilities. Each case study will provide an overview of the technology and discuss why the technology was selected, project objectives, how the system was designed, how the system is/will be operated, measured/expected performance, and unique challenges for the application. The first case study is addition of cloth disc filters at the 5.6 MGD Redondo WWTP owned and operated by Lakehaven Water and Sewer District, which completed construction in 2022. The Redondo WWTP utilizes primary clarifiers, trickling filters, and secondary clarifiers followed by UV disinfection for treatment. The second case study is improvements to enhance performance of existing continuous backwash granular media filters at the 12.7 MGD City of Marysville WWTP, which is currently in construction. The Marysville WWTP utilizes lagoons for biological treatment and UV light for disinfection. The final case study will be replacement of existing continuous backwash granular media filters with compressible media filters at the 2.8 MGD City of Snohomish WWTP, which is currently in design. The Snohomish WWTP utilizes lagoons with submerged fixed-film media for biological treatment and peracetic acid for disinfection.

Presenters

Tom Giese

Sr. Project Manager

BHC Consultants

Tom Giese is a registered professional engineer with over 28 years of consulting engineering experience focused primarily on wastewater treatment including facility planning, evaluation and design; process modeling; pilot testing; and construction management. Mr. Giese received both his B.S. and M.S. degrees in Civil Engineering from Oregon State University.

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Tacoma, WA

Topic Track: Conveyance Systems

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Geopolymer Rehab of an Arched-Shaped Storm Sewer Across I-5

Seattle Public Utilities (SPU) is responsible for 1,900 miles of pipelines providing wastewater and drainage conveyance to 1.3 million customers. As part of their proactive assessment and prioritization process, SPU identified a critical drainage pipe that served a large upstream basin that crosses Interstate 5 through heart of downtown Seattle. This pipeline is the single means of drainage conveyance from this large basin. Inspection of this 58”x36” arched shaped flat bottom corrugated metal drainage pipe indicated that the pipe was deteriorating. The pipe has numerous vertical alignment changes and a horizontal curve, which limited the feasible rehabilitation technologies. SPU performed an Options Analysis and determined that a spray-on fully structural liner that minimized loss of hydraulic capacity was the most feasible solution. Being the first time utilizing this rehabilitation technology, SPU’s team conducted a thorough evaluation of the use of geopolymers, wrote new specifications for the product, evaluated the hydraulic capacity limitations, and developed a bid package for the work. In addition, the velocities in the drainage pipe necessitated an evaluation of the abrasion-resistance of the product, leading to a requirement for the contractor to apply a sacrificial wearing course. And because of the large drainage basin, even a trace amount of rainfall resulted in flows that would be problematic to bypass. This paper will present how SPU determined that a geopolymer spray applied liner was the best solution, the site-specific design challenges of the project, the complex bypassing and evaluation of risk management versus expected costs, the presentation of the construction activities, and lessons learned. Construction was successfully completed ahead of schedule.

Presenters

Caroline Barlow, PE

Drainage and Wastewater Rehabilitation Program Manager

Seattle Public Utilities

With 20 years of experience in the municipal utility industry, Caroline currently serves as the Rehabilitation Program Manager for SPU’s Drainage and Wastewater Line of Business, overseeing $35M in annual investments to rehab drainage and wastewater pipes. Caroline uses her utility engineering and project management experience to work closely with a team to define long term performance goals and identify resource needs to deliver a programmatic capital improvements portfolio. Caroline received her BS degree in Civil Engineering from Gonzaga University and is a registered Professional Civil Engineer in Washington State.

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Seattle, WA

Rob Lee, PE, PMP

Principal

Leeway Engineering

Rob is the founder and Principal of Leeway Engineering. Rob is a graduate of Cornell University, is a licensed PE, and has 25 years of experience (all in the municipal wastewater consulting industry). After spending the first decade of his career on the East Coast, Rob has been involved with large municipal projects and programs throughout the PNW since 2008.

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Portland, OR

Greg Stevens, PE

Senior Civil Engineer

Seattle Public Utilities

Greg has 27 years of experience, with the last 24 years as an engineer for Seattle Public Utilities. Greg has overseen the gamut of rehabilitation projects conducted in Seattle over the last 2 decades. He is a licensed engineer and a graduate of the Unive

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Seattle, WA

Topic Track: Conveyance Systems

Date: Monday - 9/11/23

Time: 13:15 - 14:15

The Capacity Thief - Base Infiltration, Methods to quantify it for maximum benefit

Base Infiltration (BI) can substantially hinder a collection system's ability to convey wastewater. It is a capacity thief hiding in plain sight that operates 24 hours a day. Wastewater flows from some basins evaluated by the author have been found to be comprised of more than 60% BI. The expanding interest in modeling the performance of collection systems over extended periods has enhanced the need for more accurate estimates of BI contributions. Also, with the expanding popularity of trenchless rehabilitation methods, there is an increasing need to verify post-construction BI reductions. However, there is no clear-cut universally accepted method by which to determine or otherwise verify degree of BI from collection system basins.

This presentation addresses four empirical methods used to determine degree of BI based on sewer flow data, including % Minimum Method, the Wastewater Production Method, the Stevens-Schutzbach Method, and the Min Factor (Mitchell) Method. Each method is evaluated using 45 case study system basins. The basis and assumptions of each method will be shown. These empirical methods were tested against a chemical parameter verification method that involves regressing hourly parameter concentrations (TOC, BOD, TSS, and COD) with sewage flow rates; regression graphs of which will be presented.

The simple-to-use empirical Stevens-Schutzbach equation is recommended as a universal, yet conservative BI quantification Method and the Min Factor or Mitchell Method is based on WEF guidance and considered to be an accurate and defensible method.

Presenters

Paul Mitchell

Regional Engineer

ADS Environmental Services

Paul Mitchell is Senior Region Engineer for the West Coast Region of ADS Environmental Services and is a Registered Civil Engineer in California and Nevada. He has over 30 years of experience in the Water/Wastewater industry, with the past 20 years in collections systems investigations. His undergraduate work was in Chemical Engineering and his Graduate work was in Civil Environmental Engineering. He has technical papers published with ASCE and WEF.

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Huntington Beach, CA

Topic Track: Conveyance Systems

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Demonstrating Reduction of Inflow and Infiltration in Sandy, Oregon

The City of Sandy is a small community (population 13,000) located in the foothills of Northwest Oregon's Mount Hood. The City operates 38 miles of sanitary mainline pipe, six pump stations, and a single wastewater treatment plant. Challenges facing this wastewater system include influent flows that frequently exceed plant capacity during wet weather, deferred maintenance on the plant, and a limited six-month discharge permit that results in dilution violations during the shoulder months (April and October).

In 2019, the City completed a Wastewater Facilities Master Plan for the City, which recommended balancing investments between improving treatment facilities and reducing flows from the collection system. Soon after the plan was published, the City commenced with an effort to reduce inflow and infiltration (I/I) from their collection system in order to minimize the need for increasing treatment plant capacity. At the same time, the City moved forward with much-needed improvements to the existing plant.

Because of regulatory and development pressures, the City moved forward with an I/I reduction program that leveraged alternative delivery to fast-track the construction, including work on private laterals. The City also implemented a flow monitoring program aimed at demonstrating the success of the rehabilitation to reduce flows. The flow monitoring allows for recalibration of the model and definitive quantifiable evidence of reduction of I/I during peak wet-weather events storms.

Less than four years later, the City has proactively rehabilitated over half of its collection system, including sanitary gravity mainlines and service laterals up to the structures they serve.

This presentation will discuss the planning efforts leading up to the development of an I/I program, the use of alternative delivery to assist with fast-tracked rehabilitation, the monitoring and modeling efforts needed to demonstrate compliance, the actual reductions achieved, and the funding mechanisms needed to finance the work.

Presenters

Jenny Coker, PE

Public Works Director

City of Sandy, OR

Jenny is the Public Works Director for the City of Sandy, OR. Jenny is currently overseeing two concurrent programs for both water and wastewater totally over $200M. Prior to her current role, Jenny worked for the City of Portland BES for over 6 years and in private consulting for over 17 years. Jenny is a licensed PE and a graduate of Duke and UC Davis.

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Sandy, OR

Rob Lee, PE, PMP

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Rob is the founder and Principal of Leeway Engineering. Rob is a graduate of Cornell University, is a licensed PE, and has 25 years of experience (all in the municipal wastewater consulting industry). After spending the first decade of his career on the East Coast, Rob has been involved with large municipal projects and programs throughout the Pac NW since 2008.

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Portland, OR

Yarrow Murphy, PE

Senior Engineer

Leeway Engineering

Yarrow has 15 years of experience working on municipal planning projects throughout the region, including 10 years as an employee for the City of Portland. Yarrow has led multiple I/I studies, master plans, and is known by public agencies as one of best H

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Portland, OR

Topic Track: Pump Stations

Date: Monday - 9/11/23

Time: 15:30 - 16:00

Emergency Repair Catalyzes Fast-tracked Improvements: The Bolton Pump Station Story

Clackamas Water Environment Services (WES) owns and operates three pump stations and force mains, constructed in the 1980s, that collect sewage from West Linn, Oregon, and pump it across the Willamette River to an interceptor sewer in Oregon City. One of these pump stations, the 5.0 MGD Bolton Pump Station, includes a 16-inch-diameter ductile iron force main.

The force main experienced breaks in both May 2017 and February 2021 in the heavily-wooded area of Maddox Woods Park. After the second break in the force main, WES faced a decision to either remove many mature fir and cedar trees to replace the section of the force main that had experienced the breaks or realign the pipeline to follow a walking path that increased the static head on the pumps. Knowing the pump station needed additional maintenance and reliability improvements, WES decided to protect the trees and kick off a more comprehensive project.

This presentation will tell the story of the force main repairs and the follow-up evaluation and improvements to increase the pump head limits, increase firm pumping capacity, and replace additional sections of the force main that had significant corrosion. It will outline the approach to provide interim backup pumping, accelerate the schedule to procure long lead equipment, and report on the construction phase improvements. The audience will also learn about the unique system hydraulics and the use of an intertie connection with another pump station to assist with bypassing during construction.

Presenters

Jessica Rinner, P.E.

Civil Engineering Supervisor

Clackamas WES

Jessica is a Supervising Engineer and project manager with almost 30 years of experience planning, designing, and rehabilitating wastewater infrastructure and pump stations. Throughout her career, she has had the opportunity to work on wastewater collection systems in Cambridge and Boston, Massachusetts; New Orleans and Baton Rouge, Louisiana; and across the United Kingdom. She is currently serving as a project manager for Clackamas Water Environment Services.

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Milwaukie, OR

Adam Crafts, P.E.

Principal Engineer

Consor North America

Adam is a Principal Engineer and project manager at Consor focused on delivering water and wastewater infrastructure in Oregon and Washington. Adam has over 21 years of experience as a consulting engineer for local agency clients.

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Portland, OR

Topic Track: Pump Stations

Date: Monday - 9/11/23

Time: 16:00 - 16:30

Designing a Lift Station Replacement within Tsunami and Sea Level Influenced Zones

The City of Bellingham's Roeder Lift Station is located near the industrial area along Bellingham Bay and serves much of the northern part of the City. The existing lift station was suspected to be operating under reduced reliability conditions during peak storm events. The City contracted with Carollo Engineers to complete an alternatives analysis and design to increase the existing lift station's pumping capacity from approximately 8 million gallons per day (mgd) to 18 mgd.

The existing dry-pit/wet-pit station is located on a small city-owned parcel of land surrounded by Port of Bellingham (Port) and Burlington Northern Santa Fe (BNSF) railroad properties. The station's existing 18-inch diameter force main is routed through a City utility easement on Port and BNSF properties including crossing under a BNSF spur track to reach the discharge manhole location. Two lift station retrofit alternatives and one new submersible lift station alternative were evaluated, including installation of a parallel force main alternative. The selected alternative included a new submersible lift station 1,100 feet northwest of its current location. The lift station design included a combination of variable speed driven non-clog submersible pumps and screw centrifugal pumps in self-cleaning pre-rotation basins with a pumping range of 1 to 18 mgd. Other improvements included 2,500 lineal feet of parallel 14-inch and 28-inch diameter force mains with trenchless installation beneath the railroad, installation of a 36-inch diameter gravity sewer main and manholes, and miscellaneous 24-inch diameter water main replacement.

One of the challenges of designing the new lift station included impacts from the 100-year flood plain, sea level rise, and the potential for tsunami flooding. Based on available mapping, the location of the new lift station is within the FEMA 100-year flood plain and the Tsunami Design Zone. The FEMA flood maps do not take into consideration future long-term change due to climate change and the rising sea level. In addition, the project needed to consider impacts related to potential tsunami flooding. As such the new station was elevated 9 feet above the existing grade. This presentation will summarize the analysis and design related to the proposed improvements.

Presenters

Erik Waligorski

Senior Project Manager

Carollo Engineers

Erik has over 27 years of experience in the planning, design, and construction of water and wastewater infrastructure projects in the Pacific Northwest.

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Seattle, WA

Tyler Whitehouse

Principal Engineer

Carollo Engineers

Tyler has 16 years of experience in the civil and mechanical planning, design, and construction of water and wastewater pump station projects across the US.

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Seattle, WA

Topic Track: Pump Stations

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Holy Moly, My Wastewater Pumps Shakes!

Equipment can vibrate when not properly installed. Three major issues can be the source of vibration: 1.) Grout holes in the steel base but no grout visible in the grout holes or smaller vent holes; 2.) The base not level and or it exceeds the Hydraulic Institute/ American National Standards Institute (HI) and American Petroleum Institute (API) criteria of 0.004 inches; 3.) Leveling nuts used to level the steel base frame.

This presentation will focus on the vibration equipment used, the data collection methods employed, and the analysis that can be used to determine the cause of the excessive vibration in pumping systems.

Presenters

John Koch

Senior Project Manager

John is a licensed professional engineer with over 5 decades of varied experience in planning, design, construction, commissioning, troubleshooting and condition assessment of water and wastewater treatment and pumping facilities in the United Stated and Canada. He is a Senior Project Manager and Vice President at HDR for over half his career and is a Board Certified Environmental Engineer by the American Academy of Environmental Engineers and Scientists.

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Topic Track: DE&I

Date: Monday - 9/11/23

Time: 10:30 - 11:30

A Rising Tide of Inclusion Lifts All Boats: A Small Business Panel Discussion

The water industry is composed of a diverse mix of people and businesses with unique perspectives of how to use innovation and inclusion to solve water challenges. The Racial and Social Justice Subcommittee of PNCWA will host a panel with small women- and minority-owned business owners, utilities/clients, and larger (prime) firms in the water industry to talk about what it is like being a Minority, Women and Disadvantaged Business Enterprise (MWDBE), the strengths they bring to the water industry, and what challenges they face. This discussion will also provide an opportunity for both large and small firms to have a dialogue about ways to address challenges faced when working together.

This discussion is intended to provide insight into the MWDBE experience, share ideas for better engaging MWDBE firms and leveraging their strengths, and give recognition to the value these critical entities provide from both a technical and a diversity, equity, and inclusion lens.

The panel will have up to 5 speakers, including two MWDBE speakers (e.g., Osborn Consulting, Leeway Engineering), one utility/client speaker (e.g., City of Portland), and one person representing larger firms (e.g., Jacobs). The panel will be facilitated by the RSJ Subcommittee. The intent for this panel is to provide multiple viewpoints into the benefits all firms in the water industry can achieve from inclusivity and open communication, and to highlight how these benefits transcend the professional world and touch our communities.

Presenters

Rob Lee

Principal

Leeway Engineering Solutions

Rob Lee is the founder and principal of Leeway Engineering, a small firm which got underway in December 2019 and has grown to a staff of 10. Rob is graduate of Cornell University and is a licensed PE and PMP with 25 years of experience in the industry. Rob is currently winding up his term on the PNCWA Board of Directors as the immediate Past President and is excited about the work PNCWA is doing to advance meaningful change in the industry.

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Portland, OR

Tarelle Osborn

Principal and President

Osborn Consulting

Tarelle Osborn, PE, founded Osborn Consulting (WBE/DBE) in Bellevue, Washington, in 2004. Since then, Osborn Consulting has grown from a firm of one to a multi-office, multi-discipline, employee-owned company with more than 85 engineers, landscape architects, and support staff. Osborn Consulting's mission is to be a collaborative team and trusted partner that delivers practical and creative water and land infrastructure solutions. As President of Osborn Consulting, Tarelle takes pride in creating opportunities for her employees and providing value to our local communities and the environment. Her professional engineering experience focuses on water resources, including storm and surface water analysis and design for public agencies. Throughout her career, Tarelle has focused on sustainable surface water and natural systems designs and values the importance of making her designs work with the environment, neighborhood, and development goals of her clients and the surrounding community.

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Portland, OR

Angela Smith

Chief Operating Officer

Minority Construction Group LLC

Angela pairs depth of experience in facilitating collaborative and dynamic conversations with over 20 years of construction consulting and project management experience in the construction industry throughout the Pacific Northwest. As a 'bridge builder',

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Portland, OR

TBD

Nicki Pozos, PhD, PE; Equity Consultant; The Formation Lab; nicki@theformationlab.com; 503.481.861; Portland, OR; Nicki Pozos brings a diverse background, encompassing a PhD in Civil Engineering, past work in water supply planning and strategic communicat

Topic Track: DE&I

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Beyond Relationships: Creating Positive Impact in Underserved Communities

Building relationships with underserved communities is a hot topic for many utilities. Though relationship building is an important first step, putting relationship building at the core of our efforts can inadvertently cause harm by consuming a community's capacity without addressing their needs. This presentation focuses on putting community capacity and needs at the heart of our engagement. The first half will focus on applying a capacity-driven model for engaging with communities of color. How can we meet people where they are, augment their capacity, then stand back and let them lead when they are ready? The second half of the presentation will focus on integrating community benefits into project implementation. How do we look beyond the current subcontracting community to create economic benefit for those who need it most?

At the end of the day, relationship building is an important first step but it comes with a responsibility to turn those relationships into positive change for those we want to serve. Only then will we truly be integrating equity into our engagement and our work.

Presenters

Nicki Pozos, PhD, PE, PMP

Principal

The Formation Lab

Nicki Pozos brings a diverse background, encompassing a PhD in Civil Engineering, past work in water supply planning and strategic communications, and current work at the intersection of social equity and public infrastructure. Nicki aspires to be the world's first engineering psychologist, bringing engineering thinking to understanding what makes people tick!

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Portland, OR

Topic Track: Community Resilience

Date: Monday - 9/11/23

Time: 13:15 - 14:15

ART – FOR THE VITALITY OF THE PUGET SOUND

Every year, millions of pounds of toxic pollutants flow into the Puget Sound. Rain washes yard chemicals, vehicle fluids, pet waste, and more down street drains directly into the Sound. For over ten years, the City of Tacoma has actively participated in the regional Puget Sound Starts Here stormwater awareness campaign, partnering with other NPDES-permitted cities and counties throughout Puget Sound. Yet despite these efforts, in 2017, a community satisfaction survey conducted by the Environmental Services Department indicated that 50% of Tacoma residents still believe stormwater is treated before entering our waterways. However, 90% of stormwater is not treated. In 2020, the City of Tacoma, Environmental Services (ES) embarked on a hyper-local stormwater awareness campaign to supplement Puget Sound Starts Here and engage our community through the work of local artists. The campaign is called "If It Hits the Ground, It Hits the Sound."

Through this campaign, art is incorporated into pavement murals, vehicle wraps, catch basin stencils, t-shirts, and videos, to communicate the impacts of stormwater pollution in more visual and cross-cultural ways. The artistic format is especially impactful because local artists generate the art to raise awareness within their own communities. In addition to art, ES hosted events to create space for community members to learn about the issues and share experiences and ideas. While providing jobs to local artists, the campaign also brings public art installations into underserved neighborhoods, transforming community eyesores into assets, discouraging vandalism, and enhancing pedestrian thoroughfares,

This presentation will describe the genesis of the pilot campaign, as well as the next steps in building on campaign awareness by pointing community members to pollution prevention actions and support resources provided by Environmental Services, evaluating campaign effectiveness, and hopefully soon utilizing GIS data, including Tacoma's Equity Index map and Watershed Prioritization tool to prioritize neighborhoods for future art installations.

Stormwater pollution jeopardizes the health of our Puget Sound and continues to impact endangered salmon and orca. It threatens the future of younger generations, and this requires all of us to ACT but that involves awareness! Our efforts show that art can directly impact the vitality of our Puget Sound.

Presenters

Josh Knouff

Environmental Services Strategic Planning Manager

City of Tacoma, Environmental Services

Josh Knouff has dedicated over two decades of service to the City of Tacoma. In his role as the Environmental Services Strategic Planning Manager, he has effectively empowered employees across the organization to drive continuous improvements. By fostering a collaborative environment, Josh

encourages employees at all levels to explore innovative and imaginative solutions for addressing complex challenges that affect the communities we serve.

Among the initiatives that Josh has actively championed is the Marketing campaign. Through proactive outreach and education, this initiative harnesses the power of local artists to engage the community through captivating stormwater art. By supporting and empowering these artists, Josh is instrumental in facilitating a unique and impactful way to communicate the importance of addressing stormwater pollution.

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Tacoma, WA

Marvin Griffin

Strategic Planning Business Services Analyst

City of Tacoma, Environmental Services

Marvin Griffin is the Business Services Analyst for the Strategic Planning Team for Environmental Services assisting with the strategic direction of “If it hits the ground, it hits the sound” campaign. Prior to working for the City of Tacoma Marvin worked for the City of Lacey conducting outreach to unrepresented groups. He also worked as the President of the Peoples Center Steering Committee collaborating with Metro Parks to bring equity to community programming.

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Tacoma, WA

Denisse Linares

Solid Waste Route Supervisor

City of Tacoma, Environmental Services

Denisse Linares is a Route Supervisor at the City of Tacoma’s Solid Waste Management Division and is overseeing Solid Waste’s implementation of an automated vehicle location solution that includes a fleet management system. She is also leading the Environ

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Tacoma, WA

Sean Olson

Engineering Construction Coordinator

City of Tacoma, Environmental Services

Sean Olson is an Engineering Construction Coordinator responsible for overseeing, inspecting, and coordinating all field operation activities related to Environmental Services construction projects. He has a pivotal role in the Environmental Services Stra

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Tacoma, WA

Topic Track: Community Resilience

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Evaluating Resiliency: Protecting Lakewood and Existing Infrastructure from Floodwaters

In 2020, The City of Lakewood completed an update to the FEMA hydrologic and hydraulic model for Clover Creek, located in Lakewood, Washington. The update revealed the 100-year floodplain for Clover Creek is significantly larger than previously modeled. The newly identified floodplain has the potential to completely close critical infrastructure, life-safety and commerce routes such as Interstate 5 (I-5), Pacific Highway, Sound Transit rail lines, and transportation routes to Lakewood's only hospital.

The City of Lakewood completed a planning level study to evaluate potential alternatives and their resiliency, to reduce flood extents and protect existing buildings and infrastructure. The goal of the study was to build a foundation for the development of measures to protect the City and infrastructure through a resilient and sustainable project.

Working collaboratively with the tribes, public, regulating agencies, and impacted entities, the study initially screened and prioritized more than twenty potential options. Once screening was completed, a more in-depth assessment of four mitigation measures was conducted which included: stream and channel enhancements; construction of new levees: one near I-5 or one near the creek; and a do nothing alternative.

The Stream and Channel Enhancement Alternative identified riparian areas and disconnected floodplains that could be expanded and reconnected to enhance the capacity of Clover Creek to reduce flooding and provide environmental uplift. The I-5 Levee Alternative identified a new levee to limit floodwaters from and west of I-5, while land east of I-5 would remain within the floodplain limits. The Clover Creek Levee Alternative is a setback levee that would limit nearly all flooding and protect critical infrastructure providing the most comprehensive flood protection. The Do Nothing Alternative provides no improvements to mitigate flooding likely resulting in a regulated floodway across I-5 and require many owners to secure new flood insurance.

Each alternative was evaluated with basic assumptions and geometry modifications appropriate for each model run, to understand potential benefits/impacts for each alternative. The presentation will discuss how the selected alternative provides the greatest benefit and most resiliency for the City of Lakewood.

Presenters

Paul Bucich

Public Works Engineering Director

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Lakewood, Washington

Ryan Retzlaff

Project Manager

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Beaverton, Oregon

Topic Track: Stormwater

Date: Monday - 9/11/23

Time: 15:30 - 16:00

Choosing a Water Quality Design Storm for Retention

The current National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits in Oregon (Permits) include significant new requirements for stormwater design standards that impact the design feasibility, facility footprint, and effectiveness of stormwater facilities. The Permits require prioritization of low impact development, green infrastructure, and retention in stormwater design standards. For retention, permittees are required to develop a Numeric Stormwater Retention Requirement (NSRR) that retains stormwater onsite and minimizes offsite discharge of pollutants. This presentation will cover methods and data assumptions used in evaluating local rainfall data to identify appropriate design storms for sizing Permit-compliant stormwater retention and water quality facilities.

For one permittee, an NSRR design storm was selected using the annual average runoff-based method to retain 80 percent of annual average runoff. The analysis considered hourly rainfall data from two local gages. The design storm was estimated using two rainfall analysis methods for comparison: a rolling 24-hour method and a storm-event method. The results were sensitive to the analytical methods and the assumptions used as input parameters for those methods such as interevent times and period of record from the two local gages. Design storm results differed in size by as much as three times.

For another permittee, after completing a rainfall analysis, a sensitivity analysis was conducted to look at the impact of a proposed NSRR on stormwater facility footprints for scenarios that included a range of infiltration rates, drawdown time limitations, and development types. Facility footprints varied by as much as four times depending on the scenario.

The selection of a design storm for onsite retention requires an understanding of the nuances and significant implications related to different rainfall analysis methods and associated assumptions. It is also important to understand the development characteristics where the retention design storm will be applied. Design storm selection based off a clear understanding of methods and assumptions will best support goals for sizing facilities. This will allow facilities to meet requirements for runoff treatment, address feasibility constraints for implementation, and right-size facilities to effectively manage stormwater runoff and protect water resources.

Presenters

Amory Cervarich

Senior Staff Water Resources engineer

Brown and Caldwell

Amory Cervarich is a senior staff water resources engineer providing compliance support, water quality data analysis, and hydrology and hydraulic modeling support. She has experience with local and regional

agencies on municipal NPDES stormwater permit compliance, stormwater design standards, and the development, calibration, and analysis of hydraulic, hydrodynamic and water quality models for TMDL reassessment support. Additionally, her experience includes proficiency with statistical analysis and spatiotemporal data analysis using MATLAB, ArcGIS Pro, and R.

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Portland, OR

Topic Track: Stormwater

Date: Monday - 9/11/23

Time: 16:00 - 16:30

What We Need vs. What We Get: Navigating Multi-use Stormwater Retrofits

The questions we ask and answer in the planning and design of stormwater retrofit projects fall into two general categories:

1) What do we need? We usually call this planning.

2) What do we get? We usually call this design.

In stormwater management the answer to what we need is rapidly changing. When many of our storm systems were first built the answer was “we need to get water away as quickly and as cheaply as possible to prevent flooding.” Today, the answer is closer to “we need a multi-use solution to retain water on-site, limit impact to surface and ground water hydroperiods, reduce pollution and erosion to protect and enhance our natural and built environments, provide community assets for place-making and access to greenspace, and prevent flooding.”

When our understanding of what we need is rapidly changing, it is challenging to set goals at the beginning of projects because we don’t know what we can get, especially in highly constrained built-out environments with limited space. The goals must adapt and evolve through the design process. Therefore, the success criteria are less goal oriented, “Did we meet our goals?” and more process oriented “Did our process optimize our solution for functionality and value?”

What we need versus what we get are the two rails of communication that must be advanced together to navigate a successful project with multiple and competing constraints and goals. If one rail gets too far ahead of the other then progress can easily be stalled, sidetracked, or derailed. So how do we tie these rails together to get what we need? We usually call this modeling.

Recent stormwater management planning and design projects will be used as case studies to discuss how modeling practices such as initial conceptualization, identifying constraints and boundary conditions, making explicit simplifying assumptions, and identifying the right approach and level of detail at the right time can be used to determine if we can need less, or if we can get more to achieve successful project outcomes.

Presenters

Joshua Owens

Water Resources Engineer

Consor

Josh embraces civil engineering as a creative profession and funnels his creative energy (and two decades of experience) into his water resources projects where collaboration and learning is always the

goal. These projects encompass stormwater management, stream and wetland restoration, and much more. From planning to design and to implementation, he enjoys improving the interconnection of our built and natural environments. This passion led him to earn his master's in water resources engineering with a focus on hydrology and geomorphology.

Recognizing that engineering projects are also communication and conflict management projects, Josh took a basic mediation training course to help understand and navigate projects through this lens. This perspective has been especially useful for working in highly constrained urban environments.

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Portland, OR

Topic Track: Stormwater

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Assessing Risk and Right-Sizing Design Using a Probabilistic Approach to Hydrologic and Hydraulic Modeling

Hydrologic and hydraulic models are typically deterministic, making assumptions about input parameters and calculating a single result for each output. However, this simplification may result in cost-increasing overly conservative assumptions. Additionally, this approach is unable to quantify risk presented by low probability events.

For example, ODOT's guidance for inlet spacing calculations is to use either 30% or 50% as a clogging factor, depending on inlet type and location. Wouldn't it be nice to know how resilient a collection and conveyance system is if some inlets are more substantially clogged during large storms?

This talk will present the basic theory of probabilistic/stochastic approaches to modeling and discuss some applications where this is already considered best engineering practice. It will show project examples using Monte Carlo simulations with common tools like EPA SWMM and HEC-RAS to create probability curves of the model outputs. The talk will include specific references to open-source Python toolkits that will help others considering creating probabilistic models.

Finally, the talk will address potential uses including risk informed decision making processes, especially climate change risk, and sensitivity analysis applied to existing deterministic models. It will also discuss some of the limitations of this approach and seek feedback from the audience members who may use similar approaches.

Presenters

Seth Sokol

Water Solutions Engineer

Parametrix, Inc.

Seth is passionate about water resources and problem solving, so he is always looking for ways to combine those in his career. Nothing makes himhappier than having some design or modeling challenge in my head, just waiting for an "aha" moment (often in the shower).

At Parametrix, Seth is also trying to grow his technical skills in H&H modeling, PS&E delivery, project management, and business development. His core skills are in stormwater management: including treatment, collection, conveyance, and flow control. He also has extensive experience in fish passage design and screening, riverine and flood modeling, and industrial stormwater treatment.

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Topic Track: Utility Management

Date: Monday - 9/11/23

Time: 10:30 - 11:30

Catalyzing Capital Improvement Plan Projects with WIFIA Financing

The Water Infrastructure Finance and Innovation Act (WIFIA) program is a government bank operated by EPA headquarters that provides supplemental, flexible, low-cost credit assistance to public and private borrowers for all types of wastewater, drinking water, and stormwater projects. The WIFIA program offers long-term loans that can be combined with State Revolving Fund assistance, municipal bonds, and federal and state grants to help communities deliver more critical water infrastructure projects for a lower cost with less impact on rate payers.

In this session, we will provide an overview of the WIFIA program and describe WIFIA's water infrastructure-related eligibilities and priorities. Additionally, we will discuss the benefits and flexibilities of WIFIA financing, including customized repayment schedules, coordination with other types of debt, the option to fund multiple projects through a single loan, and the ability to finance a combination of staggered projects, like those in a capital improvement plan, under a "master agreement". Finally, we will demonstrate, through case studies presented with current borrowers/utilities, how WIFIA loans are providing financial benefits to borrowers across the country, including over $5 billion in savings.

Presenters

Karen Fligger

Deputy Director

WIFIA Program, US EPA

Karen Fligger is the Deputy Director for the WIFIA (Water Infrastructure Finance and Innovation Act) Program in EPA's Office of Wastewater Management. Over her career at EPA, she has built her expertise in water issues by working with the Clean Watersheds Needs Survey, the WaterSense, and Urban Waters programs. Prior to joining EPA, she supported community efforts to address environmental issues in the Potomac River watershed, Vermont, and Nicaragua. Karen holds a M.S. in Natural Resource Planning from University of Vermont and a B.S. in Biology and Environmental Studies from George Washington University.

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Washington, DC

Kenneth Rice

Capital Finance Debt Coordinator

King County Department of Natural Resources and Parks, Wastewater Treatment Division

Kenneth Rice is a seasoned public finance professional with a Master of Public Administration from the University of Washington. Kenneth currently serves as the Capital Finance Debt Coordinator for the King County Department of Natural Resources and Parks' Wastewater Treatment Division (WTD). As Debt Coordinator, he is instrumental in developing WTD's debt strategy. His expertise lies in skillfully identifying potential savings, through refinancing or defeasance, and determining the ideal type, shape and timing of debt instrument transactions that align with WTD's financing objectives. Recent work includes collaborating with multi-disciplinary teams to take advantage of the opportunities WIFIA Financing offers.

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Seattle, WA

Matt Zook

Finance Director

City of Oregon City, Oregon

Matt Zook is the Finance Director for the City of Oregon City, having joined the team in 2020. With over 24 years of experience in municipal finance, Matt has previously worked for the cities of Lake Oswego, West Linn, North Bend, Damascus, and Newberg. H

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Oregon City, OR

Topic Track: Utility Management

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Reimagining a Utilities CIP Budgeting Process

The Bellevue Utilities Capital Investment Plan is a seven-year $317M capital plan for the water, sewer, and stormwater utilities that is updated every two years. In the past four years, Bellevue Utilities has made great strides in developing a successful collaborative budget process that is structured with input from the Utilities Leadership Team, Engineering Division, Operations and Maintenance Division, the Finance Group, the community. This collaborative process has been significantly boosted with process improvements in project identification and scoping, project cost estimating, project prioritization, staff resource analysis, and community engagement In addition, asset management risk information has been used to budget for asset-based rehabilitation programs such as pipe rehabilitation

and water main replacement programs.

Prior CIP budgets were successfully developed internally by engineering management; however, retirements and departures of management responsible for developing the CIP. and the challenge of finding supporting documentation, provided new opportunities for successor positions to develop the CIP. A collaborative budget framework was developed approximately 8-months prior to the Preliminary Budget deadline. The framework included the process improvements and the collaborative engagement of Utilities staff in distinct phases of the budgeting process, specifically Operations and Maintenance and Engineering staff in the project identification and prioritization, and the Engineering Project Management Group in the cost estimating elements of the budget. Over two budget cycles, the process improvements have become foundational and standardized in the budget process. The benefits of a collaborative budget process include the support and buy-in from staff at all levels of the organization; in addition, the transparency in the budget development process helps the entire utility and provides a sense of teamwork and collaboration across the Utilities Department. Although the collaborative budget process is a once every other year investment of time and energy from many staff and Bellevue Utilities Leadership Team, it results in a significantly improved capital plan that increases the department's ability to support a high level of service to Bellevue Utilities Customers.

Presenters

Brian Landau

Vice President, Water Infrastructure Innovation

WSP USA

Brian is a strategic and compassionate leader with over 20 years of public utility and environmental experience. He has a strong record of developing, implementing, and improving effective utility strategies, planning, and programs to meet and exceed organizational goals. Developed effective operation and capital programs more than $240M. Committed leader of staff development with continuous improvement to maximize talent in resource constrained organizations; creating high

performing teams that achieve excellence as well as provide meaningful employee experiences. He is skilled in navigating complex organizational structures and engaging internal and external stakeholders to achieve positive outcomes for clients and organizations.

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Seattle, WA

Linda De Boldt

Assistant Director Engineering

City of Bellevue Utilities

Linda De Boldt has over 37 years of experience in public works management and

engineering. She joined Bellevue Utilities in early 2018 as the Assistant Director

for Engineering. Prior to coming to Bellevue, Linda served as the Public Works

Director for the City of Redmond as well as the Deputy Director of Seattle Public

Utilities. Her work experience has focused on capital project delivery, operations

and maintenance of public infrastructure, resource management and environmental protection, strategic planning, and organizational management. Linda is a 1983 graduate from the University of Washington with a Bachelor of Science in Civil Engineering and is a registered professional engineer in Washington State.

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Bellevue, WA

Topic Track: Comprehensive Capital Planning

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Comprehensive planning for a Sound future

The City of Tacoma, like many wastewater utilities in the Pacific Northwest today, has choices to make about investments that are needed to meet new regulations, address aging infrastructure, and adapt to changing conditions; the scale of which haven't been experienced in decades. These choices will impact the utility, its ratepayers, and the surrounding community for decades to come. However, they also present opportunities to foster understanding of the importance and value of wastewater services, bolster support and buy-in for continued delivery, and prioritize investments in a way that meets broad community values and utility goals.

To support decision-making, the City is developing a Comprehensive Wastewater Plan to balance concurrent investment needs, achieve success in its goal areas, and meet the expectations of internal and external stakeholders. In this presentation, we will review the plan development process and how we are taking broad community values and incorporating them first into utility goals that align with City initiatives and resonate with the community and, second, into measurable technical targets that demonstrate success and can be used for capital planning. At its outcome, success for this planning process means not only developing and implementing a capital improvement plan, but demonstrating to the community that the utility is meeting its commitments in a responsible way that supports broad community values and continues to provide an essential community service.

We will present the comprehensive planning process, the big decisions the City of Tacoma is facing, and the opportunities they have to solve them using transparent and repeatable methods that produce defendable and supported solutions. We will make the case for incorporating broad community feedback into the planning process and show how it sets us up for a "Sound" future.

Presenters

Angie Smythe, PE

Brown and Caldwell

Angie Smythe is an environmental engineer and planner with Brown and Caldwell, based in Seattle, WA. She has worked with agencies throughout the Puget Sound region on comprehensive wastewater planning projects and design projects inside the fence.

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Seattle, WA

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Tacoma, WA

Topic Track: Capital Projects

Date: Monday - 9/11/23

Time: 15:30 - 16:30

Developing Equity in Design Frameworks for Public Infrastructure Projects

Public agencies and technical teams are being tasked with integrating equity into the planning and design of infrastructure projects. Even with good intent, teams often struggle to identify how a project interfaces with vulnerable communities and what changes can be made to improve outcomes for those communities. Equity in Design provides a process for identifying a project's equity interfaces and developing a solid plan for integrating these interfaces into the planning, design, and delivery of the project, resulting in positive outcomes for vulnerable communities.

The Alderwood Pump Station Replacement project, which is a current task order for Brown and Caldwell (BC) under the Price Agreement for Pump Station (PS) Improvement master services contract with the City of Portland (City), is the pilot project for the City to develop an Equity in Design framework. Our subconsultant, The Formation Lab (TFL), identified potential equity interfaces for this project, including minimizing conflicts with the houseless community, supporting pedestrian access, and supporting bicycle access. Based on these interfaces, equity criteria were developed for use in the site selection process. These interfaces are the foundation of the Equity Plan, identifying key actions and milestones for fostering equitable decisions during the design and construction phases, as well as supporting COBID (Certification Office for Business Inclusion and Diversity) certified team members during project delivery. The Equity Plan is a living document that is refined during the project to guide the Consultant team, led by BC, in meeting the City's equity goals.

This presentation will share the Equity in Design approach, and lessons-learned through the pilot application of this approach, to the Alderwood Pump Station Replacement project.

Presenters

Jessie Maran

Principal

The Formation Lab

Jessie Maran is a Principal with The Formation Lab, a small firm dedicated to increasing equity for people of color and women in the AEC industry. She brings to this equity work over twenty-five years of experience in urban design and planning for resilient cities and communications and public engagement for built environment projects. She applies her experience in urban systems to the firm's Equity by Design work—helping engineer teams understand the impact of technical projects and think outside of the project box in order to benefit vulnerable communities.

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Portland, OR

Heather Lough

Principal Engineer

Brown and Caldwell

Heather Lough has 14 years of experience specializing in process and mechanical system design, construction management, and operation and maintenance support for wastewater facilities. She acts as project manager for several large projects, including three pump station projects for BES. Heather is excited about this project and how it could change the way we undertake design projects like this to better integrate equity considerations at all stages. She looks forward to having new tools to help her teams design facilities that benefit all the communities they are part of, especially those that are most vulnerable.

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Vancouver, WA

Aaron Lawler

Senior Engineer, Pump Station and Forcemain Program Manager

City of Portland Bureau of Environmental Services

Aaron Lawler is an Engineer at the City of Portland Bureau of Environmental Services in the Treatment and Pumping Systems Division (TPSD). Within TPSD, Aaron manages the Pump Station Improvement Program, which delivers capital improvement projects at any

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Portland, OR

Topic Track: Capital Projects

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Reality is Optionality - Using Real Options for Project Prioritization and Decision Making

Decisions that operators, engineers and managers make are typically financially constrained. An intuitively good project idea can prove difficult to justify when using only net present value and similar financial tools to demonstrate return on investment (ROI). This is where the concept of "Real Options" comes into play. By identifying the characteristics of an option and assigning a financial value and probability to its selection or rejection, the decision maker gains insight into the decision that would otherwise be missed.

During this presentation, you will learn:

- What is a Financial Option, and how does it relate to a Real Option
- Types of Real Options and how to spot them
- Three methods to value a Real Option
- A rigorous approach to calculating probabilities of outcomes
- Case studies to support where Real Options have been used to support project decisions
- Case studies showing where Real Options could have been used for more favorable out

Presenters

Geoff Baldwin

Vice President

Tetra Tech

Geoff has been involved in planning, design, and management of water and wastewater engineering programs for more than 30 years. He works with clients on matters related to utility performance, adoption of innovative approaches and providing appropriate levels of service to customers. He holds an MS in environmental engineering and MBA in finance, is a board certified environmental engineer, and a registered mediator with the New York State Unified Court System.

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Portland, OR

Topic Track: Comprehensive Capital Planning

Date: Monday - 9/11/23

Time: 13:15 - 14:15

How to Predict the Future: Developing Capital Budgets Through Project Formulation

An ongoing challenge for municipalities and public agencies is developing long-range capital project cost estimate projections during early planning and conceptual design phases. All too often, initial estimates cannot fully consider the large number of project variables and potential future changes that may impact the completed project. Estimators in the early phases of a project must rely on limited and conceptual scope information that is often subject to speculation, influenced by prior project experiences, and affected by unpredictable market forces.

Historically King County's Wastewater Treatment Division (WTD) used project request forms to collect project needs and anticipated costs. A review of those projects, from initial budgetary request through preliminary design, revealed cost fluctuations of at least 200% by the time the capital project was constructed and operational, sometimes higher for large complex projects. Further investigation revealed that costs increased due to a combination of limited project definition and unforeseen scope changes, assumption of lowest cost technical options, and lack of inclusion of future external cost and schedule drivers (e.g. environmental permitting, regulatory changes, community relations, constructability). This fluctuation and discrepancy in cost made it difficult to forecast capital borrowing, set utility rates, or better manage the larger project portfolio.

To improve capital project budgeting, WTD developed the Project Formulation Program (Program) and later a Portfolio Planning and Analysis unit. The Program uses a dedicated team and consistent approach to develop a defined project need and objective that can be the basis for a Class 5 estimate. The intent is to identify and evaluate a feasible technical approach and consider the external inputs needed to develop more informed initial, pre-funding estimates. The project's current scope, assumptions, opportunities, risks, and basis of costs are consistently documented in highly defined cost estimate tools and basis of estimate documents.

Large capital projects move slowly, and few formulated projects have been implemented since the program's start in 2016. However, recent project estimates appear to be closer to expected actual project costs, leading WTD to consider how best to expand the Program.

Presenters

Ann Grothe, PMP

Portfolio Development Supervisor

King County Wastewater Treatment Division

Ann Grothe has been working in King County's Wastewater Treatment Division (WTD) for 25 years and was a Capital Project Manager for 15 years. She led teams working on large, complex infrastructure and IT projects and created WTD's Capital Project Formulation program. Ann is currently a supervisor in

WTD's Portfolio Planning and Analysis Unit which delivers timely, accurate information needed to make capital investment decisions. Ann's duties include improving business processes, staff training, coordination of conceptual planning efforts and ongoing management of the Capital Project Formulation program.

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Seattle, WA

Amanda McCloskey

Project Control Engineer

King County Wastewater Treatment Division

Amanda McCloskey is a Project Control Engineer (PCE) who has been working for King County's Wastewater Treatment Division (WTD) for the last seven years and has been supporting the Formulation Program since inception. Prior to this, she worked for an Engineering and Architectural Consulting firm providing project administration services and information technology support. Amanda's current responsibilities include cost forecasting and cashflow analysis, CPM scheduling and contract administration support for small and large scale capital projects.

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Seattle, WA

Petra Liskova, PMP

Project Manager

Jacobs

Petra is a project manager with more than 11 years of experience in planning, design, and construction management focused on wastewater projects for municipal clients. Petra successfully brings projects to completion by providing a solutions oriented appr

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Bellevue, WA

Karla Kasick, PE, PMP

Project Manager

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Karla is an environmental engineer with 17 years' experience in environmental engineering, planning, design and construction management. Her experience includes wastewater collection and treatment design, wastewater master planning, and wastewater feasibi

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Bellevue, WA

Topic Track: PFAS

Date: Monday - 9/11/23

Time: 10:30 - 11:30

Impact of Several Biosolids Stabilization Technologies on PFAS

Per- and Poly-Fluoroalkyl Substances (PFAS) are a large family of organic compounds, including more than 12,000 synthetic fluorinated organic chemicals used in commercial, consumer and industrial products since the 1940s. Conventional wastewater treatment methods do not efficiently remove PFAS which are resilient to degradation and tend to sequester to the treated solids produced and the resultant biosolids. In its most recent (2021) review of pollutants in biosolids, the US EPA identified eight PFAS in biosolids, and is undergoing a problem formulation process which will serve as the basis for determining whether regulation of Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) in biosolids is appropriate. If EPA determines that a regulation is appropriate (currently expected in 2024), biosolids producers will be required to meet certain standards. This potential outcome of EPA's review underscores the importance of understanding technical solutions available to treat PFAS in biosolids if required based on EPA's review process.

To assist utilities and biosolids producers to understand options available to mitigate potential PFAS contamination in biosolids, Jacobs collected several biosolids products for testing including composts, dried biosolids and pyrolyzed dried biosolids, all produced from non-industrially impacted biosolids to assess the concentration of PFAS compounds in the finished products and the ability of these processes to reduce and or remove PFAS compounds.

Presenters

Todd Williams

Senior Principal

Jacobs Engineering

Mr. Williams has a 42-year career in environmental engineering with operating and design experience and specific emphasis in residuals and biosolids management. Todd has supported dozens of biosolids and residuals management master plans in his career which include adaptive planning to manage emerging contaminants such as PFAS. Todd is an engineering graduate of Virginia Tech and previously served as the Chair of the Water Environment Federation's Residuals and Biosolids Committee. He is currently the chair of NCOne Residuals and Biosolids Committee. Todd works out of Jacobs Charlotte, North Carolina office where he serves as Jacob's Global Principal for Residuals Resource Recovery and Biosolids Management.

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Charlotte, North Carolina

Topic Track: PFAS

Date: Monday - 9/11/23

Time: 11:30 - 12:00

PFAS – Understanding the Latest Regulatory Landscape, Treatment Approaches, and Communications Challenges for Municipal Biosolids

Federal and state regulatory agencies have growing concerns about public health and environmental wellbeing associated with per- and polyfluoroalkyl substances (PFAS). As of this writing, the United States does not yet have federally enforceable PFAS standards for drinking water, wastewater, or biosolids. This has left states to develop their own regulations to address PFAS contamination, creating a diverse regulatory patchwork across the country. State regulations on PFAS in drinking water are becoming common, but now a few states are also enacting regulations on PFAS in surface water and biosolids as well. For example, Michigan has developed screening levels for PFAS in biosolids, and Maine has effectively banned biosolids land application due to concerns about PFAS.

The EPA plans to complete a risk assessment for two PFAS [perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS)] in biosolids for land application by Winter 2024. PFOS is commonly detected in biosolids at a concentration around 10 ppb, even without any industrial sources. A biosolids PFOS limit below that level could widely restrict land application, having a large impact on our industry. This risk assessment requires knowing many parameters for PFAS toxicity, occurrence, fate, and transport. This presentation will walk through the risk assessment process, what parameters are known, and which are not.

In the event of a less than 10 ppb limit on PFOS in biosolids, utilities may seek to treat PFAS in biosolids. Ongoing research on PFAS-destroying technologies includes investigations into incineration, pyrolysis, gasification, supercritical water oxidation (SCWO), hydrothermal liquefaction, and hydrothermal alkaline treatment. This presentation will compare the latest known PFAS destruction efficiencies, market readiness, and other considerations that impact the feasibility of these technologies for widespread use. A regulatory update on proposed legislation in the pacific northwest will also be provided. Recommended messaging to service customers will also be discussed.

Presenters

Cameron Clark

Associate Vice President

Carollo

Cameron Clark is an associate vice president at Carollo Engineers. He is a solids and energy specialist with over 20 years of experience in the industry.

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Seattle, WA

Libby Bakke

Principal

Consor

Libby Bakke is a principal of Consor Strategic Planning & Communications and has 22 years of experience in strategic water communications. She is widely known for her planning and outreach expertise, working with elected officials, interest groups, and the public to build long-term support and trust for programs and projects.

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Seattle, WA

Topic Track: PFAS

Date: Monday - 9/11/23

Time: 13:15 - 14:15

Talking PFAS: Best Practices for Effective Engagement on Emerging Challenges

"Forever Chemicals," parts per trillion, Health Action Levels, "over 5,000 chemicals," "found in everyday products"—these phrases are common in articles and communications about PFAS to the public. To the general public, they are hard to put into context. They can be confusing, if not frightening, leading to lots of questions that are hard to answer. With the technical nature of PFAS removal and the developing research about PFAS health impacts, providing clear concise information to the public is challenging.

Meanwhile the water and wastewater industries are working hard to reduce the amounts of PFAS in drinking water, treated wastewater, and biosolids; doing research to know more about risks; and developing and testing new technologies for PFAS removal. It is increasingly critical for the public to understand risks and the steps that their utilities are taking to work on this issue.

There is a strong need for clear, timely, and proactive communication on PFAS removal. Public awareness can build support and the understanding water utilities will need to invest in and implement programs to address PFAS and other future challenges.

Holly Tichenor will show how using best communications practices creates an increased level of engagement and an understanding of PFAS risk in wastewater and biosolids. She will present examples of how to integrate strategic engagement early in the process, how to work with technical teams to support the development of sound messaging and provide examples of how stakeholder engagement and community outreach work together to create clear, accurate, and timely risk communications for positive outcomes.

Presenters

Holly Tichenor

Strategic Engagement Manager

Brown and Caldwell

Holly brings 26 years of strategic planning and communications experience for water and wastewater projects and programs across the U.S. She focuses on the value of alignment with internal and external stakeholders for effective clean water program decision making, communications and implementation. Her work involves strategic facilitation utilizing techniques and tools proven to foster trust building, clarity, and support through all program phases.

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Topic Track: PFAS

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Dominant Sources of PFAS to WRRFs and Their Fate in Land-Applied Effluent and Biosolids

PFAS are a contaminant of major concern for WRRFs due to current and imminent state and federal regulations as well as increasing concern from the public. Because WRRFs are not designed to destroy or remove PFAS, source control will be an extremely important mechanism for reducing PFAS concentrations at WRRFs. For effective source control, an understanding of the dominant sources of PFAS to the WRRF is critical. However, PFAS are frequently detected in domestic, commercial, and industrial wastewater discharges with varying concentrations and are complicated by the presence of 'precursors' and PFAS-like compounds. A method is needed for identifying and addressing the site-specific dominant sources of PFAS to a WRRF.

While some states have propagated regulations to land-application of biosolids due to PFAS concerns, little is known about the fate of PFAS in land-applied biosolids, and even less is known about the fate of PFAS in land-applied reuse water. To protect the environment as well as protect beneficial biosolids and reuse applications, a better understanding of the fate of PFAS is needed in soils, groundwater, and surface waters.

Since 2019, Clean Water Services (CWS) has been conducting regular PFAS monitoring at the WRRFs, the collection system, and industries. Some of the results of this study were presented at PNCWA in 2022. Since that time, CWS has expanded the monitoring to include soils at biosolids and reuse land-application sites, groundwater at reuse irrigation sites, surface waters around the watershed, and more industries. CWS also has been collecting PFAS data from sewersheds dominated by a single land-use to help identify the dominant sources of PFAS to the WRRFs. Throughout the monitoring, CWS has been working with industries with high measured PFAS and/or high flows to develop PFAS Management Plans. Much has been learned about the contribution of WRRF discharges to the PFAS burden in surface waters, the fate of PFAS in land-applied reuse and biosolids, the dominant sources of PFAS to the WRRFs, and the effectiveness of outreach efforts. This talk will report the findings of these efforts since last year, lessons learned, and our PFAS roadmap for the next three years.

Presenters

Scott Mansell, PhD, PE

Principal Engineer - Research and Innovation

Clean Water Services

Scott is a Principal Engineer in the Research and Innovation Program at Clean Water Services in Hillsboro, Oregon. Scott's career in research and engineering has covered an exceptionally wide range of subject areas within the One Water arena including wastewater, stormwater, reuse, soils, surface waters, and the watershed. He currently leads the research efforts at Clean Water Services related to advanced continuous sensing, PFAS and emerging contaminants, and advanced modeling and data analysis. He has

collaborated on many research projects and studies with universities, consultants, and other utilities around the country. After earning a PhD in Environmental Engineering from UC Berkeley in 2012, Scott worked in consulting for 5 years before coming to Clean Water Services in 2017. He is a registered engineer in the State of Oregon and serves in several regional and national professional societies especially the Oregon Association of Clean Water Agencies.

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Hillsboro, OR

Joy Ramirez

Environmental Services Manager

Clean Water Services

Joy Ramirez is the Environmental Services Manager. She's been with Clean Water Services since December 2016 and provides regulatory oversight and implementation for the industrial pretreatment, industrial stormwater, water quality facilities and operational incident programs. She has over 15 years of utility operation experience in wastewater, stormwater, drinking water and collections systems.

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Hillsboro, OR

Topic Track: Regulatory

Date: Monday - 9/11/23

Time: 15:30 - 16:30

Beating the Heat: Process Modeling and Pilot Testing to Develop Strategies for Effluent Temperature and Thermal Load Limit Compliance

Clean Water Services (CWS) operates three water resource recovery facilities (WRRFs) that are subject to thermal load and daily maximum 1-hour average effluent temperature limits under their watershed-based NPDES permit. Current compliance strategies include water quality trading, flow augmentation, wetlands treatment, and riparian shade and recycled water programs. The recent discovery of the invasive emerald ash borer is expected to decimate the population of Oregon ash trees, a major riparian shade species. To expand their temperature management portfolio and compliment these "outside the fence" strategies, CWS is conducting studies to better understand temperature dynamics in WRRFs and explore potential "inside the fence" mitigation strategies.

Several models have been published that account for the major heat gains and losses from the activated sludge process. These models were reviewed and adapted into a spreadsheet that allows the temperature dynamics of each unit process in the WRRF to be modeled. The model was calibrated to three months of data collected at the Durham WRRF.

The calibrated Durham temperature model shed light on the relative contribution of each unit process to the overall thermal balance of the WRRF and was used to identify the most significant heat sources and losses in each. The aeration basins were the largest contributors to increased effluent temperature. The secondary and tertiary clarifiers gained heat during the day and lost it overnight. In contrast, the covered primary clarifiers largely followed the influent temperature with less extreme daily temperatures.

Basin shading was explored as a potential peak hour effluent temperature mitigation strategy. First, solar radiation was reduced by 90% in the model, which suggested peak hour temperature reductions > 0.5°C were possible. Second, a two-month pilot study was conducted at the Rock Creek WRRF. Two basins were evaluated side-by-side. One was left uncovered while the other was covered with a shade cloth with a 90% UV reduction rating. The peak effluent temperature from the shaded basin was lower than the unshaded basin by 0.2°C on average.

This presentation highlights the insight gained from temperature modeling in WRRFs and highlights basin shading as a promising low-capital, low-energy temperature mitigation strategy.

Presenters

Chris Maher

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Nick Guho

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Boise, ID

Topic Track: Regulatory

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Holistic Approach to Improved Nutrient Management – Water Research Foundation Project No. 4974

Clean water agencies, regulatory agencies, and watershed stakeholders are searching for innovative approaches and best practices to address water quality challenges due to nutrient enrichment and a changing climate. Through a series of interactive workshops in three different geographic regions, this Water Research Foundation project developed a framework to advance nutrient management that fosters innovation and new opportunities. The project goal is to focus on approaches that may be applied nationally and tailored to address unique water quality improvement needs and varying watershed contributions from point and nonpoint sources.

The culmination of Water Research Foundation Project No. 4974 is a new framework to improve holistic watershed nutrient management through Practices, Policies, and Partnerships. "Practices" refers to the technical considerations related to nutrient removal wastewater treatment, best management practices for nonpoint sources such as stormwater and agricultural land uses, and nutrient processing and impacts on receiving water environments and the atmosphere. "Policies" refers to the regulatory, institutional, and administrative aspects that govern nutrient management. This includes nutrient discharge permitting and compliance with receiving water quality standards, as well as watershed management requirements. "Partnerships" refers to the potential for collaboration, building relationships and trust, and leadership in nutrient watershed management. This includes consideration of diverse stakeholders with varied interests that may, or may not, be aligned.

This nutrient management framework provides a structured process with key success factors that can be tailored to develop holistic watershed-based nutrient reduction plans. Balanced nutrient reduction plans that integrate practices, policies, and partnerships should yield more effective and efficient implementation focused on consensus-based outcomes that provide greater net environmental benefits. The framework also provides a diagnostic lens to identify missing elements of existing nutrient reduction efforts that have not achieved planned outcomes.

Impacts of climate change and environmental justice (EJ) challenges were overarching themes that are addressed through this framework and within each element. Climate change complicates water resources management in multiple ways, from extreme weather events to potentially more significant responses to waterbody nutrient inputs (e.g., harmful algal blooms). The overarching issue of EJ spans all three nutrient management factors (practices, policies, and partnerships). Poor water quality may disproportionately impact certain underserved communities where impaired conditions cannot be avoided, or if the community cannot afford the investment necessary to address the causes of the impairment.

Presenters

David L. Clark

Senior Vice President

HDR

David Clark is Senior Vice President and serves as HDR Engineering, Inc.'s Market Sector Director for Wastewater. He has more than 40 years of consulting experience and currently leads strategic efforts in understanding wastewater regulatory issues as they affect wastewater utilities. Mr. Clark was the regulatory liaison for the Water Research Foundation (WRF) Nutrient Challenge research program and the lead author on regulatory issues. He is the Principal Investigator for the WRF Holistic Approach to Improved Nutrient Management research project (WRF4974).

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Boise

Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 10:30 - 11:30

Rebranding Carbon: From Waste to Food

As wastewater treatment facilities are being rebranded as water resource recovery facilities, carbon is being viewed in a new light. Traditionally, the removal of carbon, expressed as biochemical oxygen demand (BOD) or chemical oxygen demand (COD), is the primary objective in wastewater treatment. However, with recent nutrient removal requirements and energy recovery incentives, carbon is now viewed not as a waste, but as food for the biological nutrient removal process and a source of renewable energy by capturing and re-using the digester gas. The increased attention on carbon benefits is now putting a spotlight on how it is managed across the entire treatment facility process. Understanding the nuances of carbon management is a critical issue for many municipalities, as more treatment facilities in the Puget Sound area are required to provide nitrogen removal, while others have both effluent nitrogen and phosphorus limits. To gain insight on how carbon can be used, it is critical to know the factors that affect carbon management. This presentation will provide a discussion of these factors including presence and types of primary treatment, biological nutrient removal requirements, energy recovery potential and methods, fermentation use, and external carbon sources. In the first case study, a treatment plant currently without primary treatment and digestion is being retrofitted to include primary treatment and digestion. While carbon re-use was not originally the main driver for the plant expansion, carbon management has become an important topic during the planning and design process. The implications of adding primary treatment and potential future fermentation are presented. In the second study, the carbon values of different digester gas uses are compared to the offsets of external carbon addition with sludge fermentation. This study allows a comparison of both costs and greenhouse gas emissions based on the different carbon management schemes. The findings from these examples can be applied to many municipalities in the Northwest as they are faced with the need to meet more stringent nutrient limits and to become more energy-neutral.

Presenters

Patricia Tam

Senior Principal Engineer

Brown and Caldwell

Patricia Tam is a senior process engineer at the Seattle office of Brown and Caldwell. She has 27 years of environmental engineering experience and focuses mainly on design of biological treatment systems in municipal wastewater treatment plants. She also has experience in plant capacity assessment, aeration system design, plant-wide solids mass balance, UV system design, odor control, and hydraulic modeling. As a project manager or process lead, she has worked on complex facility planning and rehabilitation projects.

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Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 11:30 - 12:00

Resource Recovery Success in Pima County, Arizona

This presentation provides an overview of Pima County RWRD Biosolids and Biogas Management Program's two sustainability projects: beneficial biogas utilization and controlled struvite formation. The Pima County RWRD serves the City of Tucson Arizona and the surrounding communities. The PCRWRD serves 900,000+ wastewater customers within a service area of approximately 700 square miles. It owns and operates 3,400 miles of sewer pipes, 66,000 manholes, 29 active lift stations, and two major regional Water Reclamation Facilities and several small sub-regional WRFs.

PCRWRD's has been proactively planning for biosolids and biogas beneficial utilization. Land application continues to be the preferred option for its Class B biosolids due to lower cost, simpler to operate, satisfies current regulations, and is consistent with current market conditions. For biogas utilization, different options have been considered, such as CHP for onsite plant use, CNG for fleet use, recovery of carbon dioxide, district heating system, use of excess thermal energy to generate ice for local skating rink, among others.

In the past, biogas was captured and used for onsite cogeneration. An Energy Study for the WRF concluded that a higher value of the one million cubic feet per day of biogas was to purify the biogas to natural gas quality and sell the product in the renewable gas market. Sale of renewable natural gas is scheduled for early 2021.

Dilution of dewatered sludge centrate, and/or chemical addition to the digesters had long been practiced to suppress struvite formation. Planning studies evaluated the pathways of struvite formation and recommended struvite sequestration to control unintended struvite formation. A struvite sequestration process has been constructed after digestion and before dewatering of the biosolids. This facility was brought into service in the fall of 2020.

Presenters

Fernando Sarmiento

Vice President

Greeley and Hansen | A TYLin Company

Mr. Fernando Sarmiento holds a bachelor's degree in mechanical engineering from the National Polytechnic School in Quito-Ecuador and a master's degree in Environmental Engineering from Arizona State University. Mr. Sarmiento is a Vice President and Southwest Area Water Sector Manager for Greeley and Hansen with 29 years of experience in the fields of water and wastewater engineering. His experience includes planning, feasibility studies, design, and project management of complex, multi-disciplined projects. He is a Board Certified Environmental Engineer and has served as program manager,

project director, project manager, and design engineer on numerous projects, including wastewater treatment plants, solids handling facilities, pipelines, pumping stations, combined sewer studies, pilot testing studies, and construction management services. Mr. Sarmiento is also a certified Project Management Professional with experience in establishing and utilizing highly effective project communication procedures and controls to optimize adherence to project goals, budget, and schedule.

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Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 13:15 - 14:15

Quality of Biogas Derived from Co-Digestion of Wastewater Solids and Organic Waste

Several WWTPs have been practicing co-digestion with FOG or food wastes to increase biogas production and subsequent energy. A main effect of co-digestion is the impact on biogas quality. Depending on the quality of the organic waste used, co-digestion may alter the concentrations and/or introduce additional impurities to the biogas. Such change in biogas quality can impact (i) compliance with regulatory requirements and (ii) treatment needs for various end uses of biogas such as co-generation, vehicle fuel, and pipeline injection. However, limited to no information is available on complete characterization of biogas produced from co-digestion of different feed stocks with wastewater sludge. The Water Research Foundation (WRF) project focused on investigating the relationship between a wide range of organic wastes and the resulting biogas quality from their co-digestion. This presentation will highlight: field and bench scale co-digestion of wide range of organic wastes and impact on biogas quality and quantity, complete biogas characterization including major components, siloxanes, VOCs, alkanes, ketones etc, guidance to estimate emissions more accurately from co-digestion and evaluation of biogas quality parameters to assist with permit compliance.

Presenters

Dr. Bhargavi Subramanian (Gavi)

Senior Staff Engineer

Kennedy Jenks Consultants

Dr. Bhargavi (Gavi) Subramanian is a Staff Scientist in the Applied Research Group based out of the San Francisco Bay Area offices of Kennedy/Jenks Consultants. Her specialties include co-digestion, resource recovery, anaerobic digestion process optimization and digester foaming mitigation. She has successfully completed various full-scale wastewater grant co-digestion projects funded by Water Research Foundation (WRF) and California Energy Commission (CEC). She has nearly 8 years of experience in research and technology development of wastewater treatment. Gavi earned her Ph.D. in Environmental Engineering from Illinois Institute of Technology, Chicago.

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Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 14:15 - 15:15

Creating Partnerships with Local Sources of High Strength Wastes through a Co-digestion Program

Clean Water Services (CWS) is pursuing an opportunity to use available digestion capacity of the Rock Creek Water Resources Recovery Facility (WRRF) by developing a Co-digestion Program. This program serves two purposes: (1) it allows CWS to better serve the district by creating and strengthening relationships with surrounding industries as well as with local contributors that can provide High Strength Wastes (HWS) and, (2) it increases the overall biogas generation to a quantity that allows CWS to consider Renewable Natural Gas (RNG). This is mutually beneficial, as this service can lower the discharge costs of the industries' byproducts and their environmental impact. Furthermore, our biogas system infrastructure is aging, which makes shifting to RNG and partner with Northwest Natural an attractive prospect.

Multiple groups within CWS are collaborating in this program to systematically identify, characterize and select wastes that can contribute to gas production goals for RNG without compromising digestion capacity and stability. The evaluation process consists of:

1. Defining the capacity of the system and gas production goals. This has allowed us to stablish an initial requirement of 4.4 ft3of gas/gallon of HSW.

2. Identifying sources of HSW within our service district. We engage with contributors to determine the reliability of their practices and consistency of their product.

3. Assessing potential impacts to operations and maintenance of the digesters, and infrastructure requirements. This is achieved through:

a. Novel bench-scale testing approach,

b. Pilot testing,

c. Evaluation of the physical characteristics of the HSW.

4. Selecting the HSW and negotiating with suppliers.

This presentation will focus on the challenges associated to implementing this program, which include: coordinating efforts from multiple groups within and outside CWS, pushing a recalibration of the organization's culture to get staff buy-in, and to make data-driven decisions based on results from relevant testing. Additionally, we will talk about our operational experience using fats, oil and grease at the Durham WRRF that has helped define our HSW selection criteria.

Presenters

Ornella Sosa Hernandez

PhD

Clean Water Services

Ornella Sosa-Hernandez is an Operations Analyst in the Technology Development and Research group at Clean Water Services. She received her Ph.D. of Science and Engineering from the Monterrey Institute of Technology and Higher Education in Mexico specializing in Environmental Systems, after obtaining a Bachelor of Science in Biotechnology Engineering.

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Tigard, Oregon

Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 15:30 - 16:30

Increased Energy Recovery with the Microbial Hydrolysis Process

The production of biogas, a renewable resource, was increased using the microbial hydrolysis process (MHP) with anaerobic digestion. Anaerobic digestion performance was enhanced with the MHP using Caldicellulosiruptor bescii (C. bescii), a hyper-thermophilic bacterium. The innovative MHP enhances any anaerobic digestion process by adding a bioaugmentation stage. Digestate from an anaerobic digester (AD) is fed to a hydrolysis tank populated with C. bescii for a hydraulic retention time of 2 days at 75 degrees Celsius (C). The C. bescii hydrolyses cellulose and other recalcitrant volatile solids that are otherwise resistant to digestion into volatile acids. These volatile acids are returned to the AD where methanogens convert them into biogas. MHP was tested at lab-scale and pilot-scale with anaerobic digestion of solids from three water resource recovery facilities (WRRF). The three WRRFs were the City of Gresham Wastewater Treatment Plant in Gresham, OR with mesophilic anaerobic digestion (MAD) and fats, oils, and grease (FOG) addition; Encina Water Pollution Control Facility (WPCF) in Carlsbad, CA with MAD; and Oakland County's Clinton River WRRF in Pontiac, MI with thermal hydrolysis process (THP) and MAD. These WRRFs had high performing full-scale AD systems averaging 58-60 percent volatile solids reduction (VSR). A test AD system with MHP was compared to a control AD system without MHP. The addition of MHP enhanced the AD performance of all three WRRFs from a VSR of 60 percent to over 75 percent. Enhanced performance would result in a 25 percent increase in biogas production and corresponding reduction in biosolids production. A conceptual design was completed for implementation of MHP at VCS (VandCenter) Denmark's Ejby Mølle Water Resource Recovery Facility (EMWRRF). A calibrated whole-plant model was used to evaluate MAD performance with and without MHP. The model incorporated VSR results from lab-scale and pilot-scale testing of MHP. Results of modelling at EMWWRF predicted an increase in VSR from 55 to 75 percent corresponding to a 36 percent increase in biogas production.

Presenters

Dave Parry

Vice President, Senior Fellow

Jacobs

Dr. David Parry is a vice president and senior fellow technologist at Jacobs and their leading expert on anaerobic digestion. He is a registered professional engineer in several states and provinces. He earned his B.S. and Master's degrees in mechanical engineering from Brigham Young University and his Ph.D. from the University of Illinois at Urbana-Champaign. He has more than 40 years of experience in planning, designing, researching, and providing construction and operation assistance for wastewater treatment, solids processing, and energy projects. Dr. Parry has been principal investigator for research on anaerobic digestion, co-digestion, pyrolysis, gasification, and combustion. Dave is a patent holder and inventor of methods to enhance the performance of anaerobic digestion.

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Topic Track: Resource Recovery

Date: Monday - 9/11/23

Time: 16:30 - 17:00

Resource Recovery: A Case Study on How Thermal Processes and Beneficial Utilization Strategies Were Combined to Provide Best Solution for the Canoas WRRF in Bogotá, Colombia

“Empresa de Acueducto y Alcantarillado de Bogotá (EAAB)”, Bogotá, Colombia, is responsible for the implementation of the Bogotá River Sanitation Program. EAAB currently operates the 90-MGD Salitre WRRF, located on the north end of the city, which is undergoing an upgrade to expand its capacity to 160-MGD. This plant will treat 30% of the city’s wastewater. EAAB recently completed the design of the 370-MGD Canoas WRRF, to be located in the southern end of the city. The Canoas WRRF will treat the remaining 70% of the city’s wastewater, with a total service area population of 7.2 million.

The Canoas WRRF secondary treatment facilities designed include activated sludge step-feed aeration, secondary clarification, and chlorine disinfection. The associated solids train include sludge thickening, sludge pre-dewatering, thermal hydrolysis process (THP), anaerobic digestion (AD), biosolids dewatering, beneficial utilization of biosolids and a Biogas Co-generation facility.

The solids line for the Canoas WRRF was designed with two main objectives: 1) minimize Biosolids production, 2) maximize beneficial utilization and energy recovery.

A critical component of the solids train is the THP/AD system. This process allows less sludge to be generated versus conventional anaerobic digestion, given the greater VSS destruction and improved sludge dewaterability, generating biosolids which can be classified according to its pathogen content as Class A biosolids. This baseline design scenario was later compared with other biosolids minimization processes (thermal drying, solar drying, and incineration, among others), together with a preliminary market study of potential uses of the end product, to determine the most cost-effective solution.

The design also considered biogas utilization for onsite co-generation. The use of Combined Heat and Power (CHP) is anticipated to utilize the biogas for electric energy generation as well as production of the steam required for the THP system. An estimate of 12 MW of electrical power will be generated to cover plant uses (close to 2/3 of the plant’s electrical power requirements). Heat from the exhaust gases of the turbines will be recovered and used to produce the vapor needed for the THP, thus maximizing the energy recovery in the plant, and saving critical electrical energy costs.

Presenters

Alejandro Montes

Office Director

Greeley and Hansen Colombia

Mr. Alejandro Montes holds a Bachelor's degree in Civil Engineering from the Javeriana University in Bogotá, Colombia and a Master's degree in Hydraulic Engineering from IHE-Delft, The Netherlands. He is a Senior Associate of Greeley and Hansen and the current Office Director at Greeley and Hansen

Colombia, with 19 years of professional experience in the fields of stormwater/wastewater drainage, wastewater treatment and river engineering. For 8 years he served as technical advisor to the Bogotá Water Utility, Empresa de Acueducto y Alcantarillado de Bogotá EAAB-ESP, focused in the planning, procurement and management of urban drainage and sanitary infrastructure projects. In his years with Greeley and Hansen, Mr. Montes has served as project manager, and design engineer in numerous projects in Colombia, Ecuador and the United States of America, including wastewater treatment plants, sewage systems, pumping stations and combined sewer overflow studies.

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Bogotá D.C., Colombia

Topic Track: Emerging Technologies

Date: Monday - 9/11/23

Time: 17:30-18:00

Emerging Industy Technologies and Solutions 1.0

Join us for an enlightening program that delves into the forefront of the wastewater treatment industry. Discover the latest breakthroughs in emerging technologies and cutting-edge updates that are revolutionizing wastewater treatment. From advanced methods and smart monitoring systems to eco-friendly solutions, this session offers a glimpse into the future of sustainable wastewater management. Don't miss the opportunity to explore the exciting developments shaping the way we treat and protect our most vital resource – water.

Subdisciplines will be focused on:

1. Liquids Treatment
2. Solids Treatment/Handling
3. Process Controls
4. Pumping Systems
5. CSO/Stormwater Management

Presenters

Heimburger & Company/ Columbia River Carbonates, Timken/H&N Electric, Gross-Wen Technologies, ADS Environmental Services, Beaver Equipment/Xylem-Sanitaire, Slayden Contractors

MICRONA Aqua-Cal Micronized Calcium Carbonate, EASA Accredited Pump Repair, GWT Revolving Algal Biofilm Treatment, Triton + flow monitoring, Sanitaire Silver Series II fine bubble diffusers, Construction and Treatment Plant Upgrade Services

Topic Track: PFAS

Date: Tuesday - 9/12/23

Time: 10:30 - 11:30

Understanding the Fate and Destruction Mechanisms of PFAS Under Supercritical Oxidative Conditions

Rising concern of Perfluorinated alkylated substances (PFAS) contamination of our ecosystem has sparked interest in this pollutant as it pertains to water and waste management. While PFAS sources are numerous, it is widely believed that firefighting foam and extensive industrial uses are common pathways for PFAS compounds into the environment.

In an attempt to better understand the fate and transport of PFAS compounds undergoing supercritical water oxidation (SCWO), a one (1) wet ton per day scale SCWO system was employed to study the elimination efficiencies of this process. This scaled down system can accommodate a variety of aqueous contaminated wastes and allows for analyzing inputs and outputs with low to ultralow concentration of PFAS.

In this paper, we report on how three distinct PFAS waste substrates from three different sources were treated using SCWO process. The waste includes lime stabilized sludge from a municipal wastewater resource recovery facility; aqueous film forming foam (AFFF) from a DoD facility; and spent ion exchange resin from a 'pump and treat' water treatment facility.

Supercritical water oxidation or SCWO for short, is a physical-thermal process that relies on the unique reactivity and transport properties of water above its critical point (Figure 1) of 374 °C and 218 atm. At these conditions, organics are fully soluble in supercritical water, and with the addition of oxygen, all organics rapidly and completely oxidized to form carbon dioxide, clean water, and inorganic salts (Bermejo, M.D. et al., 2006; Marrone, P.A. et al., 2013; Tassaing, T. et al., 2002).

The studies examined a variety of PFAS compounds, both targeted and non-targeted, but most specifically focused on PFOA and PFOS. SCWO, on average, was able to eliminate 99.95% of PFOA and 99.99% of PFOS across all waste substrates, and greater than 99.9% elimination of all other PFAS compounds combined. The studies produced valuable data and design parameters to support design and deployment of SCWO for real world applications.

Presenters

Marc Deshusses

Co-founder & Head of Technology

374Water

Prof Deshusses is the co-founder of 374Water and patent inventor of the supercritical water oxidation AirSCWO system. Deshusses holds a Ph.D. in Chemical engineering from the Swiss Federal Institute of Technology (1994) and a BS in Chemical engineering from Ecole polytechnique fédérale de Lausanne (1990). Deshusses is a faculty professor at the department of civil and environmental engineering at Duke University since 2008 and been a professor and Chair at the University of California Riverside

between 1994 and 2008. He is a world-renown researcher in biofiltration, odor, and novel technologies that is breaking new ground in low-cost decentralized sanitation.

Authored numerous technical papers and presented at regional, national and international conferences.

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Durham

Sudhakar (Sunny) Viswanathan

VP & Head of Sales

374Water

Sudhakar (Sunny) Viswanathan is Vice President at 374Water, a global cleantech, social impact company based in Durham, NC. He has a bachelor's and a master's degree in environmental engineering, he is a Syracuse University alumnus with nearly 25 years of industry experience; He has authored over 30 technical papers and currently spearheads the commercialization and business development of the Supercritical Water Oxidation technology.

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Topic Track: PFAS

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

Some Like It Hot, but PFAS Does Not! Advancing Thermal Destruction of PFAS in Biosolids

Many wastewater agencies are facing the dual challenge of trying to address PFAS within the treatment plant and facing limitations in biosolids disposal options. This presentation will address both of those challenges and give attendees a solid understanding of how PFAS enters wastewater, accumulates in biosolids, and different destruction techniques that are being evaluated. We will specifically discuss PFAS characterization studies that have been done to-date in wastewater treatment plants, and new innovative studies where Brown and Caldwell (BC) is partnering with utilities to better understand PFAS destruction using thermal processes. This presentation will highlight recent work that is underway at Silicon Valley Clean Water (SVCW), which has the only operational large scale biosolids pyrolysis systems in the country. Because the fate of PFAS through pyrolysis is not well understood, BC has partnered with SVCW to perform special studies aiming to provide a comprehensive picture of the fate of different PFAS species, precursors, and transformation products through the biosolids pyrolysis processes. This work will provide valuable insights into the level of PFAS transformation and/or destruction within the pyrolysis system. Because thermal treatment is the only technology currently available to utilities to destroy PFAS, this research aims to characterize the extent of destruction and support the development of scientific data documenting their positive environmental impact.

For this study, parallel samples will be processed through SVCW's pyrolysis reactor, and a bench scale pyrolysis reactor coupled with a thermal oxidizer at operating conditions resembling SVCW's process. Samples of the dewatered biosolids, dried biosolids, biochar, and gas emissions will be collected for PFAS analysis, including targeted, non-targeted, and total organic fluorine to fully characterize PFAS fate through the system. Results of this study will demonstrate whether current sampling and analytical approaches approximate a mass balance for specific compounds while identifying others previously unknown. Testing is scheduled to take place this summer and results from this study may be ready to discuss prior to the presentation.

Presenters

Mary Lou Romero

Senior Engineer

Brown and Caldwell

Mary Lou is a senior engineer with Brown and Caldwell. She holds a BS in environmental engineer from Cal Poly San Luis Obispo. Mary Lou serves as Brown and Caldwell's PFAS lead for the West. Mary Lou works on a range of projects in wastewater and solids treatment planning and design. In her free time, Mary Lou volunteers with Engineers Without Borders where she leads a team helping deliver safe, clean drinking water in communities in Kenya.

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Topic Track: Nutrients

Date: Tuesday - 9/12/23

Time: 13:00 - 14:00

Full-Scale Pilot Testing of a Digital Twin Controller: The Water Research Foundation Advanced Nutrient Controller Project

A digital twin nutrient controller running a hybrid model fed with live and historical data is being developed, piloted and evaluated through The Water Research Foundation (WRF) project 5121: Development of Innovative Predictive Control Strategies for Nutrient Removal. For ease of reference, the project team has named the controller ODIN - Operational Decision-making Intelligence for Nutrient Control.

The hybrid controller combines the strengths of machine learning with mechanistic modelling. It uses both live data from SCADA as well as historical and current laboratory data. Its components include data tools, a raw sewage soft sensor, machine learning based autocalibration of the mechanistic model at its core, machine learning based forecasting, and a machine learning based emulator of the mechanistic model. This generic structure is being used to develop and pilot nutrient controllers for four full-scale facilities in an advisory mode. The research team has been very focused on not only the technical aspects of ODIN, but also the User Interface and User Experience (UI/UX), which Clean Water Services (CWS) has been leading.

The first pilot site (four total) of the ODIN controller will be the CWS Durham facility, located in Tigard, Oregon. Durham (24 MGD average treated flow) must meet a stringent seasonal monthly median effluent phosphorus limit. Primary clarifier alum addition is used to manage phosphorus loads to the aeration basins doing enhanced biological phosphorus removal. Currently, primary clarifier alum feed is controlled to maintain an operator entered mg/L alum dose. Therefore, the phosphorus load to the aeration basins varies day to day. The ODIN controller will recommend a daily alum dosing set point to maintain an operator entered target phosphorus load to the aeration basins. Initial results have so far shown to be promising, as well as providing several potential additional benefits around dynamic flow and COD/TKN 15-minute predictions in the raw sewage.

This presentation will cover both technical and human adoption aspects of the ODIN pilot test at the Durham facility. The design approach of the UI/UX to facilitate adoption of ODIN by Durham staff will be reviewed and lessons learned, both technical and cultural, will be provided.

Presenters

Bruce Johnson

Jacobs

Mr. Bruce Johnson is a wastewater technology senior fellow with Jacobs located in Denver. He has been doing wastewater treatment design for over 35 years, the last 27 of which has been with CH2M/Jacobs where he has held the roles of wastewater process and simulation global technology leader.

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Adrienne Menniti

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Adrienne Menniti, PhD, PE is a Principal Process Engineer at Clean Water Services. Dr. Menniti has 15 years of experience in planning, design, optimization and troubleshooting of wastewater treatment processes.

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Tigard, OR

Topic Track: Nutrients

Date: Tuesday - 9/12/23

Time: 14:00 - 15:00

Puget Sound Nutrient Regional Technical Assistance Project Lessons Learned in Optimization and Nutrient Reduction Evaluation

The Puget Sound Nutrient general permit (PSNGP) requires dischargers to submit a nitrogen optimization plan (NOP) and nutrient reduction evaluation or AKART evaluation (NRE) to Ecology. Through a grant from the State of Washington, AWC is providing technical assistance to prepare both the NOP and NRE for more than 20 dischargers.

This presentation will summarize progress on the work to date, give costs (capital, operation and maintenance and dollars per pound removed) as well as estimated sewer rate and environmental justice impacts for both optimization and nitrogen removal for each utility and give a summary of the group results. The presentation will outline the pathway forward to a summary Puget Sound regional nutrient study and next steps

Presenters

Amanda McInnis

Senior Project Manager

Jacobs

Amanda is a senior project manager at Jacobs. She has been working in the wastewater industry for more than 25 years. She holds an BS in Civil Engineering from the University of Wisconsin and an MS in Civil and Environemental Engineering from the University of Washington.

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Shruti Jagini

Project Engineer

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Shruti is a project engineer at Jacobs and has provided key technical assistance on the work for AWC. She holds an MS in Environmental and Water Resources Engineering from The State University of New York, Buffalo (SUNY), and a B.S. in Civil Engineering, Chaitanya Bharathi Institute of Technology.

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Carl Shroeder

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Carl is a Government Relations Advocate with the Association of Washington Cities. He is responsible for conducting research and providing technical and informational services to cities. Carl lobbies on land use and environmental issues, affordable housin

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Olympia, WA

Topic Track: Emerging Contaminants

Date: Tuesday - 9/12/23

Time: 15:30 - 16:00

Water Quality Modelling Support for the Phosphorus TMDL Update in the Tualatin River

Clean Water Services (District) provides sanitary and stormwater services to over 600,000 people in Washington County, Oregon. The District owns and operates four water resources recovery facilities (WRRFs) that discharge to the Tualatin River. In 1988, the Tualatin River basin was the subject of one of the Nation's first basin-scale Total Maximum Daily Loads (TMDL). The TMDL established criteria for ammonia and phosphorus throughout the watershed that were incorporated into permit limits. However, population and industrial growth in the Tualatin River watershed, changes in the water flow management, and adaptive management principles have influenced water quality dynamics and motivated the update of the phosphorus TMDL. In addition, the District uses alum as part of the water treatment process to meet the stringent phosphorus limits, but EPA recently established an aluminum water quality standard for Oregon that makes alum use no longer viable at current levels. Therefore, to continue our mission to protect the Tualatin River and to comply with both aluminum and phosphorus water quality criteria, the TMDL needs to be reviewed. The Oregon DEQ is committed to priorities other than the Tualatin River phosphorus TMDL and ammonia criteria. To respond to this an uncertain compliance conditions the District in collaborations with DEQ in collaboration with DEQ, the District is developing the modeling and scenarios to understand and update the phosphorus TMDL using a highly detailed and well calibrated CE-QUAL-W2 water quality model for nearly 83 miles of the Tualatin River developed by Portland State University and the District. This model simulates a variety of scenarios to understand the assimilative capacity of the river for phosphorus as a function of flow rate, the impacts of various nutrient and temperature management strategies on the water quality of the river, the impacts of changes in dam operations and river flows over the last 30 years, and the potential effects of various changes to the TMDL on Lake Oswego and downstream waterbodies. This presentation will showcase the scenario development and findings as well as the lessons learned to date when working to update an existing TMDL with new data and modeling techniques.

Presenters

Debora Piemonti

Water Resources Analyst

Clean Water Services

Debora Piemonti is a Water Resources Analyst in the Research and Innovation program at Clean Water Services (CWS). Debora specializes in hydrological and hydraulic modeling, data analysis and interpretation, as well as water quality modeling. Through her years in CWS she has participated in a series of multi-disciplinary projects to support and enrich the Tualatin River watershed management and CWS enhancement and restoration projects. Debora is the current chair of the groundwater hydrology committee for EWRI. Before workign for CWS, Debora earned a PhD in Civil Engineering from Oregon State University and spent three years in consulting.

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Julia Crown

Water Resources Analyst

Clean Water Services

Julia Crown works for Clean Water Services on wastewater regulations. She is an alumna of Portland Community College, Simmons University, and Oregon State University and holds degrees in biology and bioresource engineering. She previously worked for the City of Gresham in the Industrial Pretreatment Program and at Oregon DEQ developing TMDLs and analyzing data for the Pesticide Stewardship Program.

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Hillsboro, Oregon

Topic Track: Emerging Contaminants

Date: Tuesday - 9/12/23

Time: 16:00 - 16:30

Been there, done that- Lessons learnt from nutrient and emerging contaminant co-management strategies implemented in the East Coast

Excess nutrient discharge into receiving waters can pose a serious threat to human health and aquatic life. Nutrient enrichment of receiving streams can lead to depletion of dissolved oxygen resulting from eutrophication of the water body. DO deficits reported for portions of the Southern Puget Sound have raised concerns regarding nutrient loads discharged to the water body. While both point- and non-point sources could contribute towards these, domestic effluents, wastewater treated to secondary standards (limited N and P removal) have been identified as potential contributors.

Additionally, as population growth continues to place burdens on our existing water supplies, utilities are forced to cope with poor quality and limited quantity of potable water supplies. Contaminants of emerging concern (CEC) are recalcitrant chemicals that have tendency to bioaccumulate and are not fully removed by conventional treatment. On one hand, WRRFs are being challenged to meet increasingly stricter effluent limits and rely on advanced treatment; in parallel, water scarcity has driven utilities to embrace Integrated One Water Approach to be water-supply resilient. Although treatment technology selection in potable reuse is primarily governed by WRRF's ability to meet strict nutrient limits (N, P), co-management of nutrients and CECs in water treated across robust multi-barrier treatment schemes can be an added benefit.

This presentation will focus on lessons learnt from two case studies that highlight two different co-management approaches. The first study (WRF 4790) was aimed at identifying hotspots for pollutants (conventional and emerging) and implementing holistic co-management approaches to tackle non-point (agricultural run-off and urban stormwater) and point-sources (wastewater treatment) to improve the health of the Potomac River watershed.

The second case study is on HRSD's Sustainable Water Infrastructure for Tomorrow (SWIFT) program. The drivers for advance treatment in Eastern Virginia include depletion of groundwater resources, water quality concerns in the Chesapeake Bay, sea level rise and wet weather concerns. The benefits of advanced (non-RO based) multi-barrier scheme (ozone-BAC-GAC-UVAOP) to meet strict nutrient limits (TN= 5 mg/L, TOC= 4 mg/L) and treat CECs will be discussed.

Presenters

Gayathri Ram Mohan

Regional Director of Wastewater Innovation

Hazen and Sawyer

Dr. Ram Mohan is a professional engineer with over 11 years of experience in advanced wastewater treatment. She received her Ph.D. in Bio-Environmental Engineering from the University of Florida and

completed post doctorate at the US EPA's Office of Research and Development as an ORISE Fellow. In her previous role as an Operations Process Engineer for Gwinnett County Department of Water Resources, Gaya supported development of capital projects, led optimization of existing processes, and applied research on advanced wastewater treatment. In her current role as Regional Director of applied research at Hazen and Sawyer, she leads wastewater innovation focused on alternate nutrient removal technologies, resource recovery, and emerging contaminants.

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Atlanta, GA

Topic Track: PFAS

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

PFAS 101 History, Regulation, and Treatment Innovation

Presentation will cover the history of PFAS, the pros and cons of common and innovative treatment technologies, and an overview of current and upcoming regulations. The session will consider the questions that should be asked when a facility is facing a PFAS problem. Case studies on successful treatment technologies will be highlighted

Presenters

Alex Evans

Director of Communications

BioLargo, Inc.

Alex is a science and technology communications professional with a passion for water treatment and environmental issues. He serves as the Director of Communications for BioLargo, Inc., a sustainable life sciences company that develops solutions for emerging water treatment challenges and environmental stewardship. He holds an MSc in Microbiology and Biotechnology from the University of Alberta, and lives in Edmonton, AB with his wife and daughter.

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Edmonton, Alberta

Topic Track: PFAS

Date: Tuesday - 9/12/23

Time: 9:00 - 9:30

Designing and Implementing PFAS Projects

Proposes new regulations are causing water systems throughout the nation to provide treatment for PFAS. The EPA and many states are in the process of setting standards for the two most common PFAS compounds (PFOS and PFOA). This presentation will provide valuable information planning, designing and construction of PFAS systems including:

- Benefits of Pilot Testing
- Selection of Treatment System Technology including GAC, IX and NF/RO
- Siting Considerations
- Operational Issues with PFAS Treatment Systems
- Design and Construction Schedules
- Capital Costs
- Operating Costs
- Lifecycle Cost of the Project
- Incorporating PFAS Systems into the existing water system

The presentation will include lessons learned on recent projects along with detailed siting, construction and cost data.

Learning Statement

This presentation will be extremely valuable for administrators, engineers and operators who are planning or are currently designing PFAS water treatment systems. The lessons learned during actual PFAS design and construction projects will help guide the attendees on when they move forward with their own PFAS projects. Attendees will leave the presentation with a better understanding of how to implement a PFAS Water Treatment project.

Presenters

Steve Tedesco

Sr. Vice President

Tetra Tech

Steve Tedesco has over 35 years of experience in the design and construction of water and wastewater treatment facilities. He is a graduate of Polytechnic Institute of NYU with a BS in Civil Engineer and is a

registered profession engineer in the State of California. Steve has designed over 15 treatment plants ranging in size from less than 1.0 MGD to over 50.0 MGD. His treatment plants have removed a wide variety of contaminates including PFAS, VOCs, 1,2,3 TCP, MTBE, 1,4-Dioxane, Perchlorate, Nitrates, Benzene, Iron, Manganese and Total Dissolves Solids. He is currently completing the design of 6 PFAS treatment plants ranging in size from 4.0 to 25.0 MGD.

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Irvine, CA

Topic Track: SCADA and Data Security

Date: Tuesday - 9/12/23

Time: 10:30 - 11:30

Programmatic Approach to Understanding and Implementing Major SCADA Upgrades and Cyber Security

As utilities strive to perform efficiently while maintaining compliance with fewer resources, the importance of a reliable SCADA system in today's cyber security environment has increased dramatically over the last ten years. Major upgrades to these critical systems are driven by component obsolescence, evolving industry standards, demand for new features, and requirements for increases in system resiliency and cybersecurity. System upgrades often include improvements to programmable logic controllers (PLCs), SCADA HMI graphic systems, communication infrastructure, network and computer systems, and even facility improvements to construct secure server and control rooms.

Implementation of SCADA improvements in existing operating process systems not only requires careful planning, design, and significant investments in material, construction, software programming labor, and field testing, but also educating managers and elected officials. In today's environment, additional challenges with long material lead time and price inflation add complexity to management of project budgets and schedules.

Clark Regional Wastewater District (Vancouver, Washington) used a multi-phase, multiple-year, programmatic approach to perform SCADA system upgrades at the Salmon Creek Wastewater Treatment Plant. The initial project replaced the plant's obsolete PLCs with a new state-of-the-art Allen-Bradley ControlLogix platform. The second phase constructed network improvements, including replacement and reconfiguration of the plant's aging fiber optic cable, construction of dedicated and secure server and control rooms, and implementation of new network and computer systems. A final project phase is replacing the plant's existing SCADA graphics with a new Inductive Automation Ignition platform, including configuration of all new graphics. Each phase provided updated system documentation to support long-term O&M. The work required significant planning for scope development, budgetary approvals, and implementation phasing, but the outcome has been overwhelmingly successful. The utility is currently working on projects to upgrade SCADA systems at their other wastewater facilities to apply the approaches from their Salmon Creek Treatment Plant as a uniform standard.

Presenters

Jeff Kanyuch, PE, PMP

Principal Project Manager

Jacobs

Jeff is a principal control system / SCADA project manager based in Jacobs' Corvallis, Oregon, design center. He has over 32 years of experience managing control system implementations and is responsible for control system delivery on all of Jacobs' design-build projects in the Western United States. Jeff has a BS in Electrical Engineering from University of Dayton (Ohio) and an MBA from Oregon State University.

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Corvallis, Oregon

Robin Krause, PE

Principal Engineer - Transmission & Treatment

Clark Regional Wastewater District

Robin has 27 years engineering experience. After about 12 years involved in roadways, stormwater, project management, construction management, Robin focused his career on wastewater. He was the Capital Program Manager and District Engineer for Clark Regional Wastewater for ten years, spent two years as a Project Manager with Jacobs Engineering, and is now back at Clark Regional as the Principal Engineer for Transmission and Treatment. Robin led the development of the initial Repair & Replacement program Salmon Creek Treatment Plant including getting approval for funding the first efforts to replace the plant PLCs.

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Vancouver, Washington

Topic Track: SCADA and Data Security

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

Collaborative Data System Development

As data volumes and reporting requirements increase, municipal wastewater utilities are faced with a rapidly changing technology landscape. A comprehensive data management master plan (DMMP) can provide strategic guidance for utilities grappling with core data topics such as governance, architecture, quality, security, integration, and analytics.

Development of a data management master plan can be a time-consuming process that delays integration of systems and delivery of business intelligence products. This presentation identifies practical approaches to efficiently developing a DMMP for utilities covering a broad spectrum of technology readiness levels. The key to selecting the right approach is to calibrate the process to match the utility's needs and capacities.

A traditional structured process will typically feature identification of data sources, ownership, responsibilities, data maintenance workflows, quality requirements, and governance policies. This is followed by the design of a data architecture that ensures data integrity, security, and accessibility while meeting the end user's analytical, reporting, and dissemination needs. The design should consider both existing and planned data repositories and associated software tools, and often features a platform evaluation component. Finally, a DMMP includes a roadmap for recommended data system improvements that provides sufficient time for procurement, development and testing and considers options for phased or incremental development focusing on priority reporting needs first. On the human side, the roadmap should include training, change management, introduction of field computing tools, streamlining of workflows, and stewardship.

Utilities seeking to accelerate the delivery of improvements to daily planning, operations, and reporting may consider a streamlined approach in which data system integration and analytical tool development proceeds concurrently with data management master planning. This approach is more tangible for system stakeholders as it focuses on the delivery of functioning data tools rather than the codification of abstract principles.

This iterative and collaborative approach is particularly suitable for utilities that have multiple core enterprise data silos but lack a comprehensive data analytics platform. By leveraging commercial off-the-shelf software and platforms, data from these enterprise sources can be transformed and stored in managed, curated, and reliable datasets. These datasets can then serve a wide array of downstream needs.

Presenters

Grantley Pyke

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Portland, OR

Topic Track: Phosphorus Removal

Date: Tuesday - 9/12/23

Time: 13:00 - 14:00

Inline Fermentation Enhances Biological Phosphorus Removal

Many WRRFs do not have consistent or sufficient VFA content available in the influent wastewater because of a low organic content or seasonal variability of the influent characteristics. The lack of influent VFA content has driven facilities to modify plant operations to generate their own VFA, utilizing embedded carbon, ensure consistent EBPR and maintaining low effluent phosphorus concentrations.

This presentation reviews two WRRFs that recently upgraded their traditional anaerobic selectors to inline fermentation reactors to produce VFA and improve EBPR.

In November 2021, South Granville Water and Sewer Authority in NC upgraded their anaerobic selector to an intensified fermentation tank by alternating a short mixing cycle with a long non-mixed deep anaerobic cycle. The generation of additional VFA lead to the proliferation of PAOs, which stabilized the EBPR process, resulting in lower and more consistent effluent total phosphorus. In addition, the plant realized a 90% reduction in mixing energy demand for the anaerobic reactors. In November 2022, having gained confidence in EBPR process, the plant initiated a plan to lower the alum feed rate 10% each month, and continues to monitor performance and lower the alum to further optimize savings.

The Warren, MI Water Recovery Facility performed a similar upgrade in 2021. The system maintained exceptionally low ORP, generated excess VFA, and utilized a unique mixing regime to transport VFA throughout the reactor without disturbing the fermentation process. In addition to achieving consistently low phosphorus effluent, well below the 1 mg/L requirement, the facility also reduced ferric consumption by 73%.

While generating VFA in the fermentation blanket is important, it is equally important to transport VFA to the PAOs throughout the reactor. The unique approach used by both plants included an update to the control logic to switch from continuous mixing to intermittent mixing. This new mixing approach operates cyclically, with complete mixing events occurring every 8-12 hours, and intermittent low-energy pulses occurring hourly during the unmixed phases. The periodic gentle pulses of low energy mixing from the fermentation blanket are used to transport excess carbon to the bulk liquid providing availability to PAOs throughout the anaerobic reactor.

Presenters

Sarah Elger, P.E.

Director of Strategy & Marketing

EnviroMix, Inc.

Sarah Elger is currently the director of strategy and marketing at EnviroMix, Inc. She received her B.S. in engineering mechanics and astronautics from University of Wisconsin and her M.S. in environmental engineering from Milwaukee School of Engineering. Sarah has more than 20 years of experience in the

wastewater treatment space, specializing in biological wastewater treatment systems and process controls. Sarah is an active member of Water Environment Federation and a registered professional engineer in the State of Wisconsin.

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Milwaukee, WI

Topic Track: Phosphorus Removal

Date: Tuesday - 9/12/23

Time: 14:00 - 15:00

Genome-centric Insights Into Full-Scale Enhanced Biological Phosphorus Removal From Wastewater

Enhanced biological phosphorus removal (EBPR) is a critical component of modern wastewater treatment strategies to protect aquatic ecosystems and capture valuable nutrients. However, EBPR process instability can create challenges for meeting stringent effluent phosphorus limits. Previous work has shown that monitoring phosphorus uptake kinetics can provide an early warning of instability events. While these methods provide a useful indicator of the functional health of the EBPR system, they do not always elucidate possible mechanisms responsible for instability events. Accordingly, we compared microbial population dynamics and their gene expression during periods of stable and unstable EBPR operation.

MLSS samples were collected from the Rock Creek Advanced Water Resource Recovery Facility (Hillsboro, OR), during both a process upset and a stable period in 2021. Relevant process performance data at the time of sampling was also recorded. Nucleic acids were extracted and sent for shotgun metagenomic (MG) and metatranscriptomic (MT) sequencing. Metagenome assembled genomes (MAGs) were assembled from the MG data to allow for more complete identification of the microbial community. Good quality draft MAGs served as the references to determine relative abundance and gene expression rates from the raw MG and MT data, respectively.

Bioinformatic analysis highlighted two cryptic microbial populations that were very abundant across both MT and MG datasets, which we refer to simply as strain 1 and strain 2. Both were distinct members of the Accumulibacter genus based on analysis of their respective MAGs, including genes for polyphosphate accumulation as well as VFA metabolism and PHA synthesis. Further, strain 2 appears to be capable of denitrification. Gene expression for VFA uptake and carbon metabolism appeared depressed in the unstable samples relative to the stable samples, while stored phosphorus utilization activity remained somewhat stable. This could be due to decreased total VFA load during the upset event. Chain elongation activity also dropped substantially, further indicating insufficient carbon availability.

This study identified two key EBPR-related populations at Rock Creek and highlighted the response of these organisms to a process upset. Overall, the gene expression profiles during the upset are supported by the process data. Further work will include analyses of additional samples and additional facilities to further corroborate the preliminary findings reported here.

Presenters

Blythe Layton

Senior Research Program Manager

Clean Water Services

Blythe Layton is a Senior Research Program Manager at Clean Water Services, where she started the Molecular Biology laboratory (m.lab) in the Research & Innovation Department in 2020. Previously she was a Faculty Research Associate at Oregon State University, as well as a Microbiologist with the Southern California Coastal Water Research Project (SCCWRP) for 5 years. Blythe earned MS and PhD degrees in Environmental Engineering Science from Stanford University, where her thesis focused on microbial source tracking in the coastal environment. Research in the m.lab uses genomic technologies (including droplet digital PCR and Oxford Nanopore sequencing) to address challenges in biological wastewater treatment, ambient and storm water quality, biodiversity assessment, and wastewater surveillance.

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Tigard, OR

Rachel Golda

Operations Analyst - Research

Clean Water Services

Rachel Golda is a researcher at Clean Water Services in Tigard, OR. She has 12 years of experience in water quality research, including assay and instrument design, microbiology, and molecular biology. She received her Ph.D. in Environmental Science and Engineering from Oregon Health & Science University in 2017.

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Hillsboro, OR

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 15:30 - 16:00

BPR Carbon Storage Insights and Questions: Adding a new tool to the box

Biological phosphorus removal (BPR) is a powerful method to meet effluent phosphorus requirements. At Clean Water Services (CWS), BPR is capable of producing effluent ortho-phosphorus concentrations below 0.1 mg/L, however at times, the performance degrades and effluent phosphorus concentrations can exceed 2 mg/L. Previous CWS work has shown measurements of the phosphorus uptake rate at the end of the aeration, which we've termed the residual phosphorus uptake rate (RPU), correlate well with BPR stability. Higher RPU rates correspond to more stable BPR and decreases in RPU can predict impending increases in the secondary effluent orthophosphate concentration. Because phosphorus uptake in some phosphorus accumulating organisms is driven by the amount of stored polyhydroxyalkanoate (PHA), it was hypothesized that the health of the BPR process is related to the biomass' ability to store excess PHA, allowing them to better manage variable loading conditions. CWS has recently optimized a PHA analysis method, allowing us to investigate this hypothesis further and to ask wider questions into the behavior of the BPR process.

For approximately 6 months, the PHA content of the biomass has been measured with each RPU batch test. Contrary to our original hypothesis, there does not appear to be a consistent relationship between RPU and the total amount of PHA in the biomass. We have therefore started characterizing the relationship between phosphorus uptake rate and PHA content at other locations along the basins. A more clearly defined relationship was identified between uptake rates measured early in the aeration basin and the polyhydroxyvalerate (PHV) concentration. We continue to explore the dynamics of phosphorus uptake and PHA content along the length of the aeration basins to build a better understanding of the relationships and variability that may be observed.

PHA data can provide further information into the behavior of the BPR process and suggest shortcomings in our understanding of key operational parameters. This paper will present the current status of the CWS PHA research and investigate other factors that may be influencing the interrelationship between phosphorus uptake rates, PHA storage and PHA utilization.

Presenters

Peter Schauer

Principal Engineer - Process

Clean Water Services

Peter Schauer is a Principal Process Engineer in the Technology Development & Research group for Clean Water Services. CWS operates four wastewater treatment facilities discharging to the Tualatin River in Washington County, Oregon. Peter is a graduate of Johns Hopkins with a masters in environmental engineering from the same school.

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Tigard, OR

Adrienne Menniti

Principal Engineer - Process

Clean Water Services

Adrienne Menniti is a Principal Process Engineer in the Technology Development & Research group for Clean Water Services. CWS operates four wastewater treatment facilities discharging to the Tualatin River in Washington County, Oregon. Adrienne has a BS from University of Cincinnati, a PhD from University of Illinois, and is super cool.

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Tigard, OR

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 16:00 - 16:30

Lower Your TIN with an Energy Win! High Efficiency, Low-DO Nitrogen Removal for Puget Sound

Stringent nutrient limits can be achieved while also providing for energy efficient process operation. The secondary upgrade at the Budd Inlet Treatment Plant (BITP) owned and operated by LOTT Clean Water Alliance in Olympia, Washington is a prime example. Upgrades to the instrumentation, aeration system, and controls associated with ammonia-based aeration control (ABAC) enabled staff to implement low-DO simultaneous nitrification and denitrification. This resulted in improved effluent quality, approximately 50% lower methanol use for nitrate polishing, and reduced aeration demand in the second aeration step. This presentation will describe the upgrades and how they can achieve extremely good nitrogen removal in the first stage of treatment, reducing loading to the second stage as an example for how similar success can be achieved at other plants in the area.

The BITP has stringent total inorganic nitrogen (TIN) limits of 3 mg/L in spring through fall, as well as total maximum daily load limits which are potentially more restrictive, depending on flow. Before and after the recent upgrades, treatment was accomplished with a 4-stage Bardenpho process. Prior to the upgrades, the first anoxic and first aeration zones were in separate tanks and aeration was controlled on a per-treatment-train basis. The upgrades combined the first anoxic and aeration stages into the old aeration tank, including new swing zones to adjust aerated volume, significantly reducing the energy required for mixed liquor recycle and reducing the treatment volume. Additional instrumentation and control were added to the new process, including influent and mid-train ammonia probes as well as dissolved oxygen (DO) probes and airflow control in each zone.

These changes provided the operators great flexibility and insight into the control of their process. Come learn how the staff put the improvements to use as they dialed down the oxygen supply using ABAC control, adjustable recycle ratios, and the swing zones. Eventually, the process moved into simultaneous nitrification denitrification (SND) giving further reductions in energy and methanol use in the second stage. Effluent TIN was maintained at 1.5 mg/l or less throughout.

Presenters

Scott Weirich

Water Engineer

Parametrix

Scott earned his Ph.D. in environmental engineering from the University of Colorado, studying wastewater treatment decentralization. He worked as a wastewater operator and project coordinator for the City of Everett, and has his Washington State Operator IV certification. Since 2018, Scott has worked for Parametrix where he has worked on projects including full scale wastewater disinfection with peracetic acid, odor control design, secondary process upset troubleshooting and optimization, secondary treatment process upgrades, and improved nitrogen removal.

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Puyallup, WA

Matt Valenta

Operations Supervisor

LOTT Clean Water Alliance

Matt is the Operations Supervisor at the LOTT Clean Water Alliance in Olympia WA. LOTT is an advanced Biological Nutrient Removal/Activated Sludge treatment plant with a Total Inorganic Nutrient limit of 3.0mg/l April thru October, which is the most stringent discharge limit on Puget Sound. He started work with LOTT as an Apprentice Operator in July of 2014. He has been an OP I, OP II, and Process Lead prior to taking over the Operations Supervisor role. Matt was highly involved with the Biological Process Improvements project from before the start of construction, and was highly involved in project goals and Process Programming.

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Olympia, WA

Layne McWilliams

Principal Consultant

Parametrix

: Layne has a diverse background in municipal engineering, construction, energy, and law. With such experience, he brings multiple tools to any project engagement, particularly where regulations, operations, and technical matters intertwine. He has manage

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Hayden, ID

Topic Track: SCADA and Data Security

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

How Two Cities Improved Cybersecurity and Resilience through Holistic Funding Strategies

Looking to improve cybersecurity and SCADA system resilience, the cities of Gresham and Medford used a holistic approach to match funding opportunities with their capital projects. With so many funding opportunities, it can be overwhelming to determine where to focus, especially when the newer programs from recently passed legislation are still developing the rules and guidelines. This presentation will give an overview of both agencies' successes and share lessons learned that will benefit other municipalities.

Federal water infrastructure funding opportunities include Water infrastructure Finance & Innovation Act (WIFIA), Infrastructure Investment & Jobs Act (IIJA), FEMA Building Resilient Infrastructure and Communities (BRIC), Inflation Reduction Act (IRA) of 2022. There are also state and local utility programs for renewable energy and energy efficiency. In Oregon, funding opportunities includes the Water/Wastewater Financing Program and Special Public Works Fund (SPWF) through Business Oregon; the Clean Water State Revolving Fund (CWSRF) through the Oregon Department of Environmental Quality; the Community Renewable Energy Grant Program through the Oregon Department of Energy; and multiple renewable energy/efficiency programs through the Energy Trust of Oregon.

Capital program assessments documented eligibility, available funding options, terms/interest rates for loan programs, and local match requirements. Projects were categorized and ranked with regards to funding evaluation criteria, including security, resilience, and renewable energy.

For Gresham, their Digestion and Cogen project has a waste-to-renewable-energy focus, so that effort included an assessment of the various federal and state programs including the new Renewable Energy Generation Tax Credits under the IRA. Applicable funding was integrated into the business case evaluation to guide selection of a renewable energy approach to provide the City with the most value.

For Medford, a formal BRIC grant application was developed requesting $22M for seismic upgrades and backup power to reduce natural hazard risk. They will also apply for additional funding to improve cybersecurity and resilience of the SCADA system.

Presenters

Jeff Kanyuch, PE, PMP

Principal Project Manager

Jacobs

Jeff Kanyuch is a principal project manager based in Jacobs' Corvallis, Oregon, design center. He has over 32 years of experience managing control system implementations and is responsible for control system delivery on all of Jacobs' design-build projects in the Western United States. Jeff has a BS in Electrical Engineering from University of Dayton (Ohio) and an MBA from Oregon State University.

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Corvallis, Oregon

Matt Noesen, PE

Clean Water US West Regional Market Solutions Leader

Jacobs

Matt Noesen is a global wastewater treatment technology leader for Jacobs with 33 years of experience leading a full range of municipal wastewater projects, including expertise in treatment plant upgrades and expansions, UV disinfection, and solving regulatory compliance issues. He has led numerous master planning projects helping clients achieve the best value for their planning budgets.

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Vancouver, Washington

Topic Track: SCADA and Data Security

Date: Tuesday - 9/12/23

Time: 9:00 - 9:30

Safe Reliable and Redundant Electrical Distribution at Tacoma's Central Wastewater Treatment Plant

The City of Tacoma Environmental Services Department (City) maintains over 800 miles of wastewater sewers, 45 pump stations, and two wastewater treatment plants including the 60 MGD regional Central Wastewater Treatment Plant (CTP). In November 2015, a 15-minute power outage at the CTP resulted in a sanitary sewer overflow, discharging untreated sewage to the environmentally sensitive and commercial waters. Immediately after the event, the City commissioned Carollo Engineers to prepare an Electrical System Analysis Study that showed that CTP's medium voltage electrical infrastructure was past its anticipated design life, did not provide independent redundancy, and could suffer a catastrophic outage leading to dangerous emergency situations threatening plant staff and the environment. The City prioritized and implemented the first level of recommended improvements including operating the plant with split power feeds and eliminating single points of failure at several process areas.

Subsequently, the City decided to build new infrastructure that provides independent electrical feeds, replaces the aged switchgear infrastructure, and eliminates other identified single points of failure. Advertised for construction in March 2020 and substantially completed August 2022, this joint City/Carollo presentation will address how this $33 million Electrical System Upgrade project overcame several key challenges during implementation:

Construction throughout a built-out site – includes replacement and centralization of the main plant switchgear, construction of a new electrical building, and routing of over 3,000 LF of concrete encased, medium voltage electrical duct banks.

Funding – low-cost loans from WIFIA and SRF programs. Project is one of the first complete WIFIA projects in the nation.

Keeping plant operational – planning between contractor, owner, and engineer to implement 74 power and utility cutovers impacting every process at the operating plant.

Construction during COVID-19 pandemic – partnership with contractor to keep the project on schedule and budget.

Easement negotiations – easement modifications and land acquisition with USACE and private railroad.

Presenters

Susanna Leung

Project Manager

Carollo Engineers

Susanna is a project manager with Carollo Engineers and has 23 years of wastewater and reclaimed water planning and design experience.

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Seattle, WA

Max Drathman

Project Manager

City of Tacoma - Environmental Services Department

Max Drathman has worked as an engineer and project manager for the City of Tacoma for 14 years. He manages capital improvements projects for Tacoma's Wastewater, Stormwater, and Solid Waste utilities.

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Tacoma, WA

Topic Track: Pipe Condition Assessment

Date: Tuesday - 9/12/23

Time: 10:30 - 11:30

Portland's Force Main Condition Assessment Program: $5M "turn-key" services for city-wide inspection and asset management

Reliably assessing the condition of buried pressurized sewer force main pipelines is one of the last remaining (and technically arduous) practical challenges for collection system managers. The failure modes for these assets can be complex and the consequences severe. This presentation will share how, as part of their proactive asset management strategy, the City of Portland, Ore. has begun a systematic approach to inspect all 100+ of the force mains in their system. The discussion will focus on the two key efforts of both building a framework in which all the assessment data may be used to calculate business risk to the City, and deploying the full suite of field investigation technologies presently available in the marketplace. To be successful, first the risk-based framework needed to be capable of distilling inspection data from multiple vendors, sources, and methods into meaningful insights for the likelihood of failure in different scenarios. The objective was to provide a framework by which the force main risk could be objectively compared (in “apples to apples terms”) to the risk posed by other assets in the City’s portfolio. Secondly, when it came to the field deployment of inspection tools, because most older force mains were constructed before inspection technologies were available, success depended on anticipating the necessary site-civil, pipe-mechanical, and operational/logistical updates needed for each investigation. This presentation will cover both these aspects of the program and provide two different perspectives: that of the municipal system owner responsible for overseeing the effort and ensuring that it addressed the resources and needs specific to the City; and that of the condition assessment service provider responsible for the execution of the program and analysis of the inspection data. Concepts for asset management best-practices related to force mains will be presented; as well as practical metrics for cost and schedule associated with implementing a force main field investigation program. The session will be geared towards collection system asset managers, operations & maintenance specialists, and conveyance engineers.

Presenters

Molly Nause-McCord

Wastewater Collections Systems Maintenance Engineer

City of Portland, BES

Molly Nause-McCord is a Wastewater Collections Systems Maintenance Engineer for the City of Portland’s Bureau of Environmental Services. She is a professional problem solver and science enthusiast. For over 13 years Molly has worked in sewer and stormwater infrastructure including managing new construction, urgent site repairs, condition assessment activities, and field engineering. Molly holds a Civil Engineering degree from the Oregon Institute of Technology.

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Portland, OR

Daniel Buonadonna

Global Principal

Jacobs

Dan Buonadonna is a Global Principal for Jacobs's Condition Assessment and Rehabilitation Services (CARS) community of practice. He has over 22 years of pipeline analysis, design, and rehabilitation experience and is an executive board member for the North American Society of Trenchless Technology. Dan holds Civil Engineering degrees from the University of Notre Dame, and the University of California, Berkeley.

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Seattle, WA

Topic Track: Pipe Condition Assessment

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

Catalyzing a Sound Future for Inspecting and Maintaining Piping Assets

The City of Portland Bureau of Environmental Services (BES) Columbia Blvd Wastewater Treatment Plant (CBWTP) was first constructed in 1952 and continues to expand. Many process pipes and plumbing systems are original to the plant's construction. Prior to this project, most pipes had not been inspected internally during their lifetime or assessed for their condition and remaining useful life (RUL). The CBWTP has experienced an increase in pipe breaks in the recent years causing process areas to be shutdown, creating a detrimental impact on plants operations and a sharp increase in financial expenditures. Frequent breaks and leaks have also taken significant a toll on the operations and maintenance staff who are continuously patching piping systems to ensure reliable operations of the treatment plant.

BES condition assessment program has engaged with Kennedy Jenks consultants to prioritize, inspect, and assess plant process piping to move BES towards proactive management of its pipe assets. The primary goal of this project is to identify BES's risk exposure due to these aging pipe assets to enable tailored and sustainable long-term replacement/ rehabilitation strategies.

This presentation will outline the vision and catalysts for this project, along with sharing success stories and how other utilities can adopt similar programs. Attendees will learn about developing a truly integrated asset management solution, from identifying pipe assets, managing these process piping assets in CMMS, developing GIS tools, 3D scanning and modelling tools, applying risk and prioritization tools, using advanced condition assessment technology and conducting this with careful coordination with plant scheduling restraints. Finally, the presentation will focus on the aspect of creating a cultural change in managing assets, one that proactively inspects piping systems and avoids unforeseen breaks and leaks through effective risk communication long after the team members have moved on.

Presenters

Sarah Burch, PhD, PE

Associate Engineer

Kennedy Jenks

Sarah Burch has 5 years of experience working for Kennedy Jenks working in asset management, environmental compliance, and stormwater treatment design. Portland BES and Kennedy Jenks embarked on a 5-year project to create the Condition Assessment Program, and Sarah has been the boots on the ground coordinating inspections, 3D scanning, and GIS mapping. Halfway through the project, she is becoming a local expert in inspection technologies and risk-based inspection strategies. Sarah graduated from RPI with a MS and BS degree in Environmental Engineering and from Oregon State University with a PhD in Water Resources Engineering.

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Portland, Oregon

Brittany Downing, EIT

Sr. Engineering Associate – Mechanical

City of Portland, Bureau of Environmental Services

Brittany Downing has 5 years of experience working for the City of Portland Bureau of Environmental Services in the Maintenance Reliability and Asset Management Group. She is working to develop the Condition Assessment Program and specializes in predictive maintenance strategies, including vibration monitoring and reliability-centered maintenance. Brittany supports inspections by researching drawings, identifying access points, reviewing inspection reports, and determining future inspection intervals and/or timeline for replacement. Brittany graduated from Oregon State University with a degree in Mechanical Engineering and also assesses maintenance and operational strategies to ensure assets are run most efficiently.

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Portland, OR

Topic Track: Pressure Sewers

Date: Tuesday - 9/12/23

Time: 13:00 - 14:00

Industry Misunderstanding of Low Pressure Sewer: Flow Study and Analysis of Gravity vs Low Pressure

Abstract Title

The Industry Misunderstanding of Low-Pressure Sewer: Flow Study and Analysis of Gravity vs Low Pressure Collection Systems.

Presentation Description:

FUD Knox serves 100,000 people in East TN. The collection system consists of 600 miles of line, 200 of which are low pressure sewer with 4000 low pressure pumps. After multiple years of sewer rehabilitation in the gravity system it became apparent that the lower pressure system was operating on a much more efficient and economic schedule due in large part to almost nonexistent I/I. FUD Knox determined to validate what both our finance and operational staff were observing through an in-depth analysis of independent sections of the gravity and low- pressure piping networks. An independent consultant was retained to look at flow data during wet weather, operations and maintenance cost, constructability and health and safety.

FUD Knox has a comprehensive internal flow monitoring program that keeps 75 flow monitors deployed continuously in the sewer system. In 2016 flowmeters were installed at predetermined areas in both the gravity and low-pressure systems. Information was collect for 12 months to insure data from multiple rain events were captured. The utility's finance department tracked all operations and maintenance cost during the same time frame. At the end of the 12-month period all information was accumulated, the engineering analysis was performed, and a technical report developed.

The compiled information was even more surprising that suspected. During multiple heavy rain events, I/I was almost nonexistent in the 4 low-pressure subbasins where flow meter were installed and monitored. In the gravity subbasins that were analyzed, I/I was detected and had a direct effect on the wet weather peaking capacity at the wwtp. Also confirmed during this evaluation of gravity system data was both the increased operations cost and safety risk due to pipes installed much deeper in the ground.

Today, FUD Knox has incorporated low-pressure EOne pumps into our new construction protocol as a preferred method of delivery. Multiple miles of pipe and over 1000 new low-pressure pumps have been installed since the initial study. The utility has also continued to compile data from both the gravity and low-pressure systems and is currently in the process of commissioning another follow-up study to both revalidate the initial study and also the practices that have been adopted by the utility .

Presenters

Bruce Giles

CEO

First Utility District of Knox County

Bruce Giles currently serves as the General Manager of First Utility District of Knox County, a system that provides water and wastewater services to approximately 100000 people.

Prior to joining FUD, Bruce spent 13 years working for the City of Oak Ridge Public Works Department, 4 years with CH2M HILL where he served as the Program Manager focused primarily on EPA Consent Orders dealing with sanitary sewer rehabilitation and 3 years with Cannon & Cannon where he serves as Vice President of Operations.

He holds a bachelor's degree from East Tennessee State University in Environmental Health and holds certification from the National Leadership Training Institute. He currently serves on the Board of Directors for the TN Association of Utility Districts, the TN Utility Assistance Board and is a Governor's appointment to the TN Utility Management Review Board.

He is married with 4 children, 7 grandchildren and is his spare time he enjoys anything outdoors.

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Knoxville Tennessee

Topic Track: Pressure Sewers

Date: Tuesday - 9/12/23

Time: 14:00 -15:00

From Septic to Sewer: Pressure Sewers as the Catalyst for Improving Water Security for Communities

For over 50 years, pressure sewer systems powered by grinder pumps have emerged as an effective solution for septic tank replacement sewer projects.

A pressure sewer system consists of a network of small diameter pipes that are pressurized to move wastewater from individual homes or buildings to a central collection point, typically a treatment plant or a larger sewer system. Grinder pumps, which are installed at each individual property, are used to break down solid waste and pump it into the pressurized pipes.

One of the key applications of pressure sewer systems is in "septic-to-sewer" projects. In these projects, an established community has chosen to enhance environmental and public health quality with a wastewater collection system. Beyond the technical advantages of pressure sewers, the practical and logistical simplicity of deploying the system often results in a more affordable and sustainable solution for the community. Specifically, the footprint of pressure sewers is much smaller than alternatives like gravity sewers or septic tank effluent pumping (STEP) systems. Furthermore, the constructability of pressure sewers enables minimal distribution to the local communities, avoids damage to private property and existing vegetation, and returns valuable land back to the community.

This presentation will highlight the benefits and best practices of grinder pump pressure sewers in these septic-to-sewer projects. These best practices are the results of lessons learned over the last several decades of working in similar projects in the Pacific Northwest, across the United States, and across five continents. Examples of these best practices in action will be shared through various real-world projects and case studies.

At the conclusion of this session, the attendees should recognize the benefits, differentiators, common missteps, and keys to successful septic-to-sewer projects. By demonstrating these factors, the audience should gain an appreciation for how stakeholder can leverage pressure sewers and how the benefits of pressure sewers will be a catalyst to facilitate more septic-to-sewer projects as we collective seek to improve environmental quality of life.

Presenters

Derek Lachut

Director of Engineering

Environment One Corporation

Derek Lachut is the Director of Engineering for Environment One Corporation (E/One). In this role, Derek formulates and executes the technical strategy for the company by leveraging input from all stakeholders – from engineers and local governments, to end users and the operations community. Derek has been with E/One since 2006 and held a variety of roles including product engineering, project manager,

regional sales manager, and international sales manager. Derek has been involved in the design and deployment of E/One pressure sewer systems in 5 continents and has witnessed first-hand how these systems solve challenging problems and protect environmental quality of life. Derek holds a Bachelor of Science in Mechanical Engineering from Case Western Reserve University and a Master of Science in Engineering Management from Clarkson University.

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Niskayuna, New York

Topic Track: Biosolids Management

Date: Tuesday - 9/12/23

Time: 15:30 - 16:00

Supercritical Water Oxidation: A Promising Alternative for Biosolids Management

Utilities have been investigating new technologies to diversify their end products from water reclamation facilities (WRRFs) due to strict regulations around land application of biosolids and recent concerns on presence and accumulation of poly-fluoroalkyl substances (PFAS) in biosolids. Water above 374°C and 22.1 MPa becomes supercritical, a special state where organic solubility increases, and oxidation processes are accelerated. Supercritical Water Oxidation (SCWO) is a promising technology that converts organic material (biosolids) to inert gases, minerals and water.

SCWO has been recently shown to destroy hazardous substances such as halogenated compounds including PFAS. Studies showed a greater than 99% reduction of the total PFAS identified in a targeted compound analysis, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) (Krause et al, 2022). As a destructive technology, SCWO is proposed as an alternative to incineration and other combustion processes and could be a permanent solution for PFAS-laden biosolids or solid matrices. However, additional investigation of reaction byproducts: water, solids and air emissions need to be conducted for a complete assessment of SCWO's potential as a safe and effective technology.

Orange County Sanitation District (OC San) teamed with 374Water, Hazen and Sawyer, and Merrell Brothers to demonstrate this technology at their site. The demonstration unit was developed based on a Research and Development (R&D) unit installed at Duke University which has a capacity of one wet tons per day. The demonstration unit has capacity of 6 wet metric tons per day and manufactured by 374Water Inc., ready to be installed. The design of the demonstration project is completed by Hazen. The research team, including OC San, 374Water, Hazen and Sawyer, Yorke Engineering, Alliance Testing worked together to develop a rigorous test plan to support permitting, design and operations. This presentation will focus on the findings from the research unit located at Duke University and the test plan prepared to identify the emissions from SCWO process. It will also discuss the challenges and advantages of the technology. The information will benefit utilities that seeks sustainable solution for their biosolids management considering recent concerns on PFAS compounds

Presenters

Derya Dursun

Senior Associate

Hazen and Sawyer

Dr. Dursun has over 16 years of experience working on biosolid management. She is currently working for Hazen and Sawyer, located in San Diego and leading Applied Research activities for Hazen's Residuals and Biosolids Practice Group. Her area of expertise spans from process modelling to innovative technologies assessments to find sustainable solutions for biosolid management. She has over 50

publications in peer reviewed journals, conferences and magazines. She is also a coauthor of WEF's Manual of Practice (MOP)

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San Diego, CA

Topic Track: Biosolids Management

Date: Tuesday - 9/12/23

Time: 16:00 - 16:30

Solids Stabilization Evaluation for West Point Treatment Plant

West Point Treatment Plant (West Point), adjacent to Discovery Park on Puget Sound in Seattle, Washington, receives flows ranging from 60 to 440 million gallons per day (mgd). Solids are treated using BFP thickening, anaerobic mesophilic digestion, and centrifuge dewatering to produce Class B biosolids beneficially used through the King County Loop™ program.

Digestion at West Point is operating near capacity and major assets are aging. West Point treats combined wastewater produced by mix of residential, commercial, and industrial customers. Solids capacity solutions must therefore address a broad range of needs and challenges, including affordability, equity, reliability and resiliency.

The study was executed in a systematic manner using a combination of economic and non-economic analyses. Our team evaluated the universe of solids handling options to determine the best method of addressing capacity constraints at West Point.

A vision statement developed collaboratively by the consultant/County team established project goals and informed decision-making criteria. A comprehensive list of solids stabilization options encompassing technologies that could conceivably address the solids stabilization capacity deficit at WPTP was developed. Technologies included digestion pre-treatment, anaerobic digestion, dual digestion, composting, chemical stabilization, thermal drying, and thermal decomposition. Options were screened using a pass/fail analysis applying criteria such as technology maturity, end uses, technology footprint and state of the industry. A short-list of technologies passing the pass/fail step were carried forward for subsequent evaluation.

Secondary technical, environmental, and social evaluation criteria were developed and applied in a series of workshops using collaboration tools such as electronic polling and interactive sensitivity analyses to reach consensus. Six alternatives were retained for further evaluation, each including anaerobic digestion as the core stabilization process. Alternatives were categorized based on desirable outcomes each might achieve (e.g., maximizing existing assets, Class A biosolids requirements, emerging contaminant risk mitigation, or nitrogen site impacts). Alternatives were further developed to evaluate capital costs, life cycle costs, carbon footprint, impacts to construction sequencing, process reliability during construction, etc. These considerations resulted in the selection of temperature-phased anaerobic digestion with thermophilic batch tanks as the recommended technology.

Presenters

Ashley Mihle

Senior Treatment Planner/Project Manager

King County

Ashley is a Senior Treatment Planner and Project Manager. She provides senior level analysis, planning, and policy development for the King County Wastewater Treatment Division's Treatment Planning Program.

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Cameron Clark

Associate Vice President

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Cameron Clark is an associate vice president at Carollo Engineers. He is a solids and energy specialist with over 20 years of experience in the industry.

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Seattle, WA

Topic Track: Pipe Inspection

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

Tips and Tricks for Cleaning And Inspection of Sanitary Sewer Siphons

Sanitary sewer siphons are the most challenging assets to inspect as they are designed to be continuously full of water, they have little to no redundancy, with typically very high flow volumes. They are also located deep underground as they are designed to carry wastewater under roadways, channels, and water bodies, so dewatering and cleaning can be difficult. The construction and operation of inverted siphons will be explained, then an in-depth explanation of the methods that can be used to dewater, bypass, clean, and inspect sanitary sewer siphons will be presented. Proactive maintenance best practices will be discussed, along with repair alternatives for various defect scenarios that we have typically discovered during siphon inspections.

Learning Objectives:

1. Explain the construction and typical operation of sewer siphons

2. Explain cleaning methods based on siphon configuration

3. Explain inspection methods for sewer siphons

4. Explain repair methods for siphon defects

Presenters

Michelle Beason, PE

Regional Manager

National Plant Services, Inc.

Michelle received a BS in Civil Engineering from Purdue University, and is a registered California PE with 30-years experience in planning, design, construction, and asset management of water, stormwater, and wastewater assets. She has worked as a Project Engineer for Black & Veatch, as an Asset Management Engineer with the East Bay Municipal Utility District, she owned her own Engineering & Construction firm, and for the last 13 years has specialized in multi-sensor inspections and trenchless rehabilitation of sewer, storm, and water assets. She is currently the Regional Manager for National Plant Services, Inc., covering the 12 Western States, including Hawaii and Alaska. Michelle also actively volunteers in many industry organizations. In addition to serving as a Board Member of the Western Chapter of NASTT, she is a Board Member of NASSCO, and is Chair of the NASSCO Infrastructure Assessment Committee. She is currently coordinating revisions and updates for Version 8 of NASSCO's PACP/MACP/LACP coding.

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Topic Track: Pipe Inspection

Date: Tuesday - 9/12/23

Time: 9:00 - 9:30

Advancing Sewer Management with Artificial Intelligence: Results from Pilot Testing AI Tools for Sewer Condition Assessments

Condition assessment of sewer systems is critical to maintaining system structural integrity and functionality and to identifying pipes requiring rehabilitation before they deteriorate past the point of renewal. Inspection of wastewater collection systems is typically completed using closed-circuit television (CCTV) cameras to provide visual inspection of the underground infrastructure. Trained technicians then review the videos, identify defects, and provide a condition rating of each pipe that has been inspected.

The recent development of artificial intelligence (AI) tools have the potential to advance the state of the practice of sewer condition assessments. AI algorithms are being developed to automatically identify defects from inspection footage. AI can also be used to identify poor quality videos so that the pipes can be reinspected. AI algorithms for defect autocoding have the potential to improve the accuracy of defect coding and reduce the time required to complete defect coding and pipe scoring. However, the use of AI for autocoding defects is not widespread and the benefits have not been documented beyond a handful of pilot studies.

As part of the City of Salem's Wastewater Collection System Master Plan, the City evaluated the ability of AI algorithms to automatically code CCTV video and obtain sewer condition assessment data. Two CCTV autocoding vendors were chosen for the pilot study. The pilot study included selecting a wastewater basin with available fully coded CCTV data, establishing testing parameters, and comparing the autocoded results to the City's own coding. Results of the autocoded CCTV videos from each vendor were compared to results provided by the City in the following categories:

Recall: AI able to find any defect within one foot (plus or minus) of City defect.

Precision: AI able to find same defect within one foot (plus or minus) of City defect.

Accuracy: AI matches the same grade level of City defect.

This presentation will describe the approach taken to evaluate if defect autocoding is a viable option for their inspection of their sewer system. Results of the comparison along with lessons learned and recommendations for implementation of AI for CCTV autocoding will also be presented.

Co-authors: Jue Zhao, City of Salem; Devin Doring, City of Salem; Jerry Smith, City of Salem

Presenters

Austin Wong

Senior Engineer

Carollo Engineers

Austin is a Senior Infrastructure Engineer with Carollo in their Seattle office. His 13 years of experience includes the planning, design, and construction of various water and wastewater projects.

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Natalie Reilly

Lead Engineer

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Natalie is a Lead Planning Engineer with Carollo in their Portland office. Her 7 years of experience spans wastewater and water planning, including hydraulic modeling, scenario planning, and design optimization.

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Portland, OR

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 10:30 - 11:30

Mainstream Deammonification via Partial Nitrification- Denitrification-Anammox (PdNA/PANDA): From Pilot- to Full-Scale Applications

Partial denitrification (PD) is being considered as a potential alternative to partial nitrification (PN) for generating nitrite. This is due to the difficulty of suppressing nitrite oxidizing bacteria (NOB) at low mainstream temperatures and nitrogen levels. The Partial Nitrification/Denitrification/Anammox (PdNA/PANDA) process is an innovative way to remove ammonia from the mainstream by partially nitrifying it to nitrate, while leaving some residual ammonia in the post-anoxic phase. In this phase, the residual ammonia and nitrite generated by PD are removed via Anammox. The moving bed biofilm reactors (MBBRs) are often used as a tertiary polishing process for biological nitrogen removal (BNR) to meet the permissible total nitrogen (TN) limit of 3 mg/L. However, this requires large amounts of external organic carbon for denitrification. By replacing conventional BNR with PdNA/PANDA, energy savings and chemical savings of up to 60% and 80%, respectively, are projected. While PdNA/PANDA has been used to reduce carbon and aeration demand in mainstream biological nitrogen removal, its applicability in tertiary processes with low influent nitrogen loading (TN < 7 mg/L), frequent storm-related loading fluctuation, and stringent effluent TN limit (< 3 mg/L) has not been explored. Additionally, previous PdNA/PANDA studies have only been performed in lab- or pilot-scale systems. This presentation will highlight the experience and lessons learned from two pilot-scale PdNA/PANDA systems from two different utilities (Fairfax VA and Everett WA), and some ongoing works that effectively demonstrate full-scale mainstream deammonification via PANDA while meeting stringent nutrient limits. The major insights from pilot-scale studies are: 1. the PdNA/PANDA system can achieve effluent TIN limit of 3 mg/L at the design HRT/load/flux; 2. practical savings ranging from 20% to 30%; 3. feed forward methanol feeding control strategy can provide means for achieving stable PdN; 4. optimizing the influent NO3/NH3 ratio is the most critical step for successfully PdNA/PANDA. The major insights from the full-scale study are: 1. startup without seeding can be achieved in under 3 months while still meeting very low TN and ammonia limits; 2. chemical savings of approximately 30% are in line with pilot-scale studies.

Presenters

Wendell Khunjar

Associate Vice President

Hazen and Sawyer

Wendell is the Director of Wastewater Innovation and an expert process specialist for Hazen. His expertise is focused on wastewater, biosolids, and advanced treatment processes, including troubleshooting anaerobic digester foaming, implementation of sidestream treatment for nutrient control, and mainstream BNR design and optimization. Wendell's peer-reviewed publication topics range from nutrient recovery to aerobic granular sludge.

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Bryce Danker

Associate

Hazen and Sawyer

Bryce Danker is an Associate engineer at Hazen and Sawyer with more than 10 years experience focused on the evaluation and design of wastewater treatment facilities.

Bryce specializes in wastewater process evaluation, optimization and design. He has extensive experience in process modeling focused on nutrient removal, pilot system design and operation, and full-scale facility evaluation, design, startup and operation. Recent focus area include PdNA demonstration, sidestream deammonification design and densification demonstration testing.

He has a B.S. in Civil Engineering from the California Polytechnic University, Pomona, and a M.S in Environmental Engineering from the University of California, Irvine.

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Yewei Sun

Principal Scientist

Hazen and Sawyer

Yewei Sun is a Principal Scientist at Hazen and Sawyer. He received his Ph.D. degree in Civil Engineering from Virginia Tech in 2020, where he also received his BS in 2014 and MS in 2016. His research focuses on the mathematical modeling and process desig

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Fairfax

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

The Power of Proactive - How Pre-Planning Set the Stage for Commissioning Success. Pre-dewatering and Thermal Hydrolysis Process (THP) Case Study in Dallas, Texas

The purpose of this presentation is to share the commissioning and start-up (C&SU) approach, execution and lessons learned of the first Thermal Hydrolysis Process (THP) built in Texas, and the second largest THP system in the United States, designed to process 375,750 dry lbs/day.

The Trinity River Authority's (TRA) Central Regional Wastewater System (CRWS) serves 1.4 million customers in Dallas metropolitan area, with a treatment capacity of 189 MGD. CRWS's Phase III B Solids Management Improvement Project includes replacement of the current lime stabilization treatment process with THP and anaerobic digestion. The goal of the Project is to significantly reduce the volume of biosolids produced and improve the classification from Class "B" to a Class "A" biosolid, which can be land applied or sold as fertilizer.

The biosolids treatment conversion from lime stabilization to THP and anaerobic digestion required both processes to operate in parallel. Due to the volume of equipment, impact to existing operations and risk associated with the activity MWH, in collaboration with TRA operations, developed a C&SU phased approach to facilitate the transition. The goal of the phased approach was to mitigate unknown process risk and minimize the impact to TRA's daily operation. One example of risk mitigation occurred during Pre-THP Process Startup phase. Upstream of the THP system, there is a series of pre-dewatering equipment needed to be optimized with process fluids prior to introduction to the THP system. During process start-up the C&SU team identified the centrifuges were rotating backwards, despite extensive factory acceptance testing, field inspections, and water startup with the equipment vendor. This issue could only have been identified when process fluids were introduced into the system. If the team had not completed Pre-THP Process Startup the equipment reconfiguration would have impacted THP startup and Digester ramping, risking the loss of biomass following Digester Seeding.

Throughout the Pre-THP and THP startup, the team worked through numerous challenges to troubleshoot and optimize the systems. This presentation will explain how the team resolved each challenge and share lessons learned, resulting in the successful C&SU of the pre-dewatering equipment and THP system.

Presenters

Kiersten Lee, P.E., PMP

Director of Commissioning and Startup

MWH

Kiersten manages MWH's commissioning and start-up group, which includes process mechanical, I&C integration, electrical and treatment process specialists. Kiersten's education and background is in hydraulics and water/wastewater treatment.

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Boise, ID

Topic Track: Watershed Management

Date: Tuesday - 9/12/23

Time: 13:00 - 14:00

The Integrated Watershed: Managing the Big Picture

The Northwest has embraced watershed planning for over twenty years as a useful way to prepare for and implement strategies to improve the health of waterways while effectively managing limited budgets and staff resources.

Now, there are new challenges facing watersheds that Parametrix has begun to integrate into watershed planning and will discuss in this presentation.

Parametrix has worked with multiple jurisdictions to develop integrated watershed plans and long-term growth management studies. Parametrix has worked with 20 plus communities on integrated watershed planning from large to small.

As part of our planning process, we will discuss how to address long-term management of existing municipal systems while also plotting courses for future land use development and responsible growth. Parametrix will discuss how to set goals; determine strategies; and define actions and funding strategies for risk management, environmental stewardship, climate change, and compliance with stormwater regulations as the population of a watershed grows.

This presentation will discuss key elements common to integrated watershed planning, including:

- Land use planning that is compatible with watershed protection targets
- Watershed prioritization and identifying key water quality issues within watersheds
- Systems for scoring and ranking needs to prioritize elements within a capital project plan
- Equity and social justice
- Retrofitting and neighborhood redevelopment
- Green infrastructure evaluation and code review
- Solutions to existing flooding problems
- Asset management and prioritization of existing infrastructure
- Managing project milestones to support public-agency grant funding
- Public awareness and involvement
- Utility rate analyses for different funding scenarios and levels of service

Parametrix will also discuss several innovative approaches that have proven successful across these different plans:

- Developing a stormwater management vision and mission, identifying measurable outcomes for each plan element, and discussing risks early on

- Straight-forward ways to address the impacts of climate change in existing design requirements

- Basin-specific water resource protection standards

- Updating development standards, including infill, redevelopment, new site development, and water quality retrofits based on a more integrated understanding of potential impacts

- Use of key habitat-quality metrics to help prioritize protection and development efforts

Presenters

John Phillips

Director of Integrated Watershed Management

Parametrix

I have been working in the water industry since 1999 and I am the Director of Integrated Watershed Management. I have experience in emergency planning, comprehensive planning, long range planning, climate change science, climate adaptation, wet weather issues, green infrastructure, and co-benefit analysis. I have an extensive background in climate adaptation, equity and social justice and applying climate science to pro-active actions. I have spent many hours working with the University of Washington Climate Impacts Group scoping specific studies to better understand how science impacts urban planning and utility planning. My work has been featured in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report and the 2014 National Climate Assessment. In addition to climate adaptation, I am recognized as a national leader in the use of green infrastructure for addressing combined sewer overflows (CSO) and integrating green infrastructure into long-term CSO control plans.

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Seattle

Paul Fendt

Senior Consultant

Parametrix

I have engaged in all aspects of storm and surface water management throughout my 40-year career. My work has included (key word search hunting): hydrologic and hydraulic modeling; shoreline restoration; floodplain studies, CLOMR, FEMA FIRM, flood elevation setting, and flood risk assessments; climate change, resiliency, climate adaptation, and sustainability; drainage and flood problem analysis; tidal and estuary design; risk management; stormwater management design; water quality compliance; AKART; BMP performance and treatment; regional stormwater facilities and stormwater parks; basin plans, stormwater comprehensive plans, and watershed planning; low impact design; environmental

permitting; stormwater programs, SWPPP, SWMP, and SSC; Clean Water Act and NPDES; wetland design and mitigation; trail, highway, and bridge design; sweeping; stormwater monitoring plans and QAPP; fish passage culverts and barrier assessment; stormwater control structure; operations and maintenance; facility optimization; and real-time controls. I am, I did, I can, I will

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Seattle, WA

Julie Brandt

Senior Engineer

Parametrix

Julie is a senior water resources engineer specializing in municipal stormwater management, community outreach, and stakeholder collaboration; NPDES compliance; watershed planning; NEPA/SEPA assessments and environmental impact statement (EIS) development

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Seattle, WA

Chad Tinsley

Senior GIS Analyst

Parametrix

Chad is a senior GIS analyst with experience

supporting stormwater, environmental, land use,

and asset management projects throughout

the Pacific Northwest. Using various GIS and

data management platforms, Chad supports

projects with mobile field sol

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Portland OR

Topic Track: Watershed Management

Date: Tuesday - 9/12/23

Time: 14:00 - 15:00

Restoring Arboretum Creek Through Partnerships and a Stormwater Park

Nestled within Seattle's Washington Park Arboretum is the Arboretum Creek, which flows northward into Lake Washington's Union Bay. As with many urban streams, this creek was suffering from the impacts of deforestation, underground piping, urbanization, and flow diversion that started more than 100 years ago. In the 1920s, several hillside springs were diverted into the combined sewer system that ultimately now contributes to historical combined sewer overflows at the Montlake Cut. The nonprofit group Friends of Arboretum Creek (FOAC) has advocated for and led Arboretum Creek restoration efforts for several years. This presentation will share the development of partnerships and plans to restore the natural hydrology of the Arboretum Creek watershed by reconnecting two of the major springs with Arboretum Creek while also addressing localized flooding and treating stormwater runoff from a major arterial. The location of the headwaters is rich with history and community interest, including being an Olmstead Brothers park, the site of UW Arboretum collections and Japanese Gardens as well as a complex array of asset owners to coordinate across. This meant that the design requires close collaboration with partners to achieve not only water quality improvement but also enhance these valuable community resources.

Through funding by King County Wastewater Treatment Division with support and collaboration from the Seattle Parks Foundation, FOAC is developing design plans to collect runoff from the two springs as well as upstream urban runoff and convey the flows to the Arboretum Creek headwaters. These flows will be managed through a treatment train with easy-to-maintain upstream presettling and a subsurface treatment wetland, and ultimately arrive at the creekbed through hyporheic discharge. But wait, there's more! The treatment wetlands will also be optimized to treat overflows from the adjacent Japanese Garden koi pond to address nutrients reduction. The presentation will highlight elements of the innovative design and summarize the collaboration and funding opportunities with partners to maximize benefits while integrating with the Washington Park vision and enhancing the horticulture collection within the park.

Presenters

Dustin Atchison, PE, PMP

Global Principal Stormwater and Watershed Management

Jacobs Solutions

Dustin serves as Jacobs' Global Principal for Stormwater and Watershed Management and has over 26 years of experience in stormwater management. He is recognized regional and national leader in low-impact development (LID) and green infrastructure with expertise in development of master plans, guidelines, education and implementation of stormwater solutions that bring multiple benefits to

communities. He has an extensive resume in stream restoration, wetland restoration, and culvert replacement projects on Puget Sound lowland streams.

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Amy Carlson, PE, PMP

Project Manager

Jacobs Solutions

Amy is a Professional Engineer (PE) and a Certified Project Management Professional (PMP) with 23 years of experience delivering water resource projects from planning through permitting and design and on through construction. She is an expert at identifying feasible solutions to address complex challenges. She effectively manages multidisciplinary and multi-firm teams, driving towards results through collaboration and attention to detail. Amy communicates effectively with both technical and non-technical audiences including core team members as well as stakeholders and permitting entities.

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Seattle, WA

Topic Track: Collection System Planning & Resiliency

Date: Tuesday - 9/12/23

Time: 15:30 - 16:00

Reimagining an Aging Sewer Network

Many US cities have aging sewer infrastructure that was built prior to environmental regulations and the development of modern urban transportation networks and associated population growth. As a result, many pipes were built in ravines, streams, and low-lying areas that were subsequently filled and built upon. As these systems age with existing challenging maintenance access, now is the time to evaluate and build more resilient sewer systems that reduce environmental, maintenance, and public safety risk. This presentation will discuss the challenges and benefits of simplifying an aging sewer network by abandoning part of an urban sewer system and reversing the flow of an existing sewer pipe.

The City of Portland identified several thousand feet of combined sewer pipe in northeast Portland for rehabilitation due to mortality risk, hydraulic capacity risk, and operation and maintenance risk. Some of these sewers are located 20-50 feet below ground in an urban park crossing arterials, highways and abandoned rail. Results from an alternatives analysis proved the hydraulic feasibility of abandoning most of the difficult to access pipes within the park and reconstructing the upstream pipe to reverse the direction of flow within the City's right-of-way. This creative solution avoids significant community disruption, reduces interagency coordination, and provides better access for future maintenance.

Reconnecting service laterals and catch basins to the reversed mainline presented the biggest challenge to flow reversal. In some sections, the proposed invert elevation is as much as 10 feet above the existing invert elevation. Additional topographic survey and potholing was needed to confirm the feasibility of reversing flow without pumping. Despite the complexities of flow reversal, this solution offered an overall benefit to the City of Portland and rate payers by simplifying maintenance and reducing the overall risk within the system.

Presenters

Becca Andrus

Water/Wastewater Engineer

WSP

Becca Andrus is a water/wastewater engineer with experience in conveyance, treatment, and planning.

Becca received her undergraduate degree in Civil Engineering from Kansas State University and a masters degree in Environmental Engineering from the University of Illinois at Urbana Champaign.

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Seattle, WA

Terence Chan

Project Manager

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Portland Oregon

Topic Track: Collection System Planning & Resiliency

Date: Tuesday - 9/12/23

Time: 16:00 - 16:30

Using the Entire Community Outreach Toolbox & More: Building Trust on the King County North Mercer Enatai Sewer Upgrade Project

Presenters

Grizelda Sarria

Sr. Project Manager

Tetra Tech

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Seattle, WA

Kristine Cramer

King County Wastewater Treatment Division

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Seattle, WA

James Chae

Operations Leader, NW Water

Jacobs Engineering Group

James has been with Jacobs for 29 years, and has focused his career on water/wastewater conveyance projects including pipelines, pump stations, and CSO facilities. He served as the Jacobs PM and overall Consultant team design manager from 2014 to 2022 o

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Bellevue, WA

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

Plastic Recycling? The Case for Integrated Fixed-film Activated Sludge in Today's Suite of Process Intensification Technologies

The past decade has seen a wave of research and development of new technologies that allow for "process intensification" – those technologies developed to increase wastewater treatment capacity using less site footprint and/or tankage volume. These intensification technologies will be instrumental in addressing nutrient limitations from treatment facilities discharging to the Puget Sound. Such newer breakthrough technologies include aerobic granular sludge (AGS), mixed liquor densification, membrane aerated biofilm reactors (MABR), and mobile organic biofilm (MOB) technologies. Compared to these technologies, the Integrated Fixed-film Activated Sludge (IFAS) process, considered one of the original process intensification technologies, is now well proven and fully established, having been developed and applied since the 1990s. With the fervor at which these newer technologies are being embraced, the question that has arisen in the industry is this: Is the IFAS process still a viable technology?

This purpose of this presentation is to examine through performance of full-scale IFAS implementations whether the known benefits of IFAS technology (e.g., process robustness, ammonia-nitrogen removal for cold wastewater) outweigh the known drawbacks (e.g., higher aeration demands). Case studies of IFAS facilities are presented, highlighting the advantages and challenges of implementing this technology at four facilities: 1) Bend Water Reclamation Facility in Oregon/USA; 2) Field's Point Wastewater Treatment Facility in Rhode Island/USA; 3) Twin Falls Wastewater Treatment Plant in Idaho/USA; and 4) Ellesmere Port Wastewater Treatment Works in the United Kingdom. The facilities have all been operating with the IFAS technology for a number of years, allowing investigation into the long-term benefits and limitations of the process. All of the facilities are able to meet their respective nutrient removal goals, providing the warranted capacity and performance requirements. Some of the facilities; however, have experienced higher than expected energy demands – specifically with respect to the seasonal air demand anticipated with the system. The viability of the IFAS intensification technology will be proven, specifically for site-constrained facilities that require improved total inorganic nitrogen removal, in documenting the success of these facilities. The shortcomings, and warranted improvements to the IFAS technology, will also be discussed – using lessons-learned from these projects.

Presenters

William Leaf

Principal Technologist

Jacobs

William Leaf is a registered professional engineer, specializing in wastewater treatment, startup and commissioning, and process optimization. Mr. Leaf has over 25 years of experience in the industry,

focusing on municipal wastewater treatment. Mr. Leaf is a vice president and principal water resource recovery technologist with Jacobs Engineering, based in Boise, Idaho.

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Boise, Idaho

Lindsey Smoot

Project Engineer

Jacobs

Lindsey Smoot is a project engineer with Jacobs, working on water resource recovery projects. Ms. Smoot has a masters degree from the University of Idaho, focusing on nutrient removal technologies.

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Boise, Idaho

Topic Track: Wastewater Treatment

Date: Tuesday - 9/12/23

Time: 9:00 - 9:30

Screenless IFAS System Eliminates Media Loss and Reduces O&M Costs for the City Of Peterborough WWTP

The City of Peterborough Wastewater Treatment Plant (WWTP) is an 18 MGD conventional activated sludge plant in Southern Ontario, Canada. The plant consists of 4 aeration trains, originally designed for conventional suspended growth. The trains were converted to a moving media Integrated Fixed Film Activated Sludge (IFAS) system in 2006 (Plant 1) and 2011 (Plant 2). The system consisted of non-engineered plastic matrix material within metal media retention cages in the first pass of each tank. The moving media system had several operational challenges including media loss, non-uniform dispersion of media, increased hydraulic head loss, screen and diffuser maintenance difficulties.

The City of Peterborough retained R.V. Anderson Associates Limited (RVA) to implement an alternate IFAS system that would address problems with the existing configuration. Various alternatives were evaluated in terms of retrofit requirements, Operations and Maintenance (O&M) obligations, life cycle costs, Environmental Compliance Approval (ECA) requirements and other criteria. The selected fixed media IFAS system was the WavTexTM woven media system by Entex Technologies Inc. (Entex). It included a total of 32 modules, each having buoyant media sheets tethered to 304L stainless steel support frames with integral coarse bubble aeration. This paper/presentation will go into details of the evaluation/selection and operation of the new IFAS system.

The final aeration tank with the new IFAS system was put in service in December 2021. To validate the system performance, testing during cold weather winter, high flow spring, and high temperature summer was required. The performance was monitored for Total Ammonia Nitrogen (TAN) removal at the rated capacity. The new Entex system was able to consistently meet TAN limits of 6 mg/L (summer) and 10mg/L (winter).

Based on the TAN results, ease of operation, and reduced O&M costs the new system proved to be able to meet the plant's needs. Further details including testing methods, other parameters tracked, and plant performance will be discussed in this paper/presentation. At the end of this project, the City of Peterborough WWTP was able to install and validate an alternative IFAS system to address O&M issues which also met effluent requirements for the full rated capacity.

Presenters

Lauren Takitch

Project Manager

Entex Technologies Inc.

As Project Manager at Entex, Lauren leads process design and simulation as well as project execution. She is also involved with project start-up and service and commercial responsibilities. Lauren began

working for Entex in 2019 as a Project Engineer and has since become well acquainted with Entex's operations and systems. She has a B.S. in Chemical Engineering and a minor in Environmental Engineering from Penn State University, which fostered her original interest in water quality and wastewater treatment.

Lauren held co-op positions in R&D with Kimberly-Clark Corporation and Technical Sales with Nalco Water. Through her work with Nalco, she gained experience in chemical wastewater treatment.

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Chapel Hill, NC

Wayne Flournoy

President & CEO

Entex Technologies Inc.

President Wayne Flournoy began his water and wastewater career over 25 years ago. Wayne has extensive technical and management experience with advanced wastewater treatment technologies, including both fixed and moving media systems, as well as IFAS and submerged fixed film systems. Prior to Entex, Wayne provided leadership as President of Kaldnes North America, promoting moving media systems, with full responsibility for all activities for this North American subsidiary of a Scandinavian company. Before that, Wayne was Director of Water and Wastewater for Brentwood Industries where he gained extensive experience with attached growth biological systems. He is well versed in biological nutrient removal and activated sludge systems, having been involved with some of the industry’s groundbreaking work on biological phosphorus removal.

Wayne has also contributed to industry leadership by serving two terms on the Water Environment Federation’s Manufacturing and Representative Committee (MARC). In addition to the wastewater industry, Wayne’s experience in the environmental industry includes tenure with landfill gas to energy project development and cogeneration among others.

Wayne has a BS in Mechanical Engineering and an MBA, both from the University of Virginia.

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Chapel Hill, NC

Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 10:30 - 11:30

To Thine Own Self Be True

To thine own self be true

Leaders develop when adversity is turned into learning opportunities. Knowing yourself is essential: what is your passion; what are your goals; what are your guiding principles?

Many leaders in operations and maintenance positions have achieved leadership roles due to sheer perseverance and an ability to turn adversity into opportunity. They have relied on educational experiences that come in the form of hard knocks, setbacks, and exhaustive overachievement. It is these experiences, when viewed as opportunities, that provide for growth. Norman Lear once said, “Everywhere you trip is where the treasure lies” (Bennis 149). This is the focus of the panel discussion.

The discussion will focus on those trips and how to turn them into treasure. How the trips may provide for personal growth and eventually leadership recognition whether formal or informal. Warren Bennis stated, “More leaders have been made by accident, circumstance, sheer grit, or will than have been made by all the leadership courses put together" (Bennis 42).

The panel will offer suggestions to help anyone struggling with adversity, to persevere with optimism, and progress toward career goals. Finding a support team that can offer different perspectives and insight into our blind spots is beneficial. The point is that the better we know ourselves, “To thine own self be true”, (Shakespeare, Hamlet 1.3), increases the opportunities we are presented.

Living your passion, demonstrating integrity and consistency, being curious and doing the right thing, especially when no one is looking, are an important foundational qualities that can be relied upon as you move forward toward achieving your goals.

While education builds skill, life builds character, it behooves us to nurture both.

Citations

Bennis, Warren G. On Becoming a Leader. Basic Books, a Member of the Perseus Books Group, 2021.

Shakespeare, William. Hamlet. Dover Publications, 1992.

The topic will be presented by a diverse panel of four individuals from various cities, roles, and perspectives, who have worked their way up the career ladder to positions in leadership. Primary contributor of the abstract is Pamela Randolph. Current panelist are Pamela Randolph, Caitlin Dwyer, and Heather Earnheart.

Presenters

Pamela Randolph

Principle, Managing Director

A Viable Solution LLC

Pamela Randolph is the Principle, Managing Director of a Viable Solution LLC. She has over 40 years in Public Service. She holds a Bachelor of Science in Business Administration with Emphasis in Human Resources, a Project Management Certificate, and a Management Certificate from UW Business School. She has held Utility Worker, Operator, Sr. Operator, Supervisor, Assistant Manager and Manager positions in 3 NW premier agencies. She is a past recipient of the William D. Hatfield award and has served on the PNCWA Leadership committee and is currently working with the Plant Operations and Maintenance committee.

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Sammamish, WA

Caitlin Dwyer

Utilities Manager

City of Arlington

Caitlin Dwyer is the Utilities Manager for the City of Arlington. She holds a Bachelor's degree in Biology with an emphasis in Neurobiology, Physiology and Behavior and a Master's degree in Hydrogeology. Caitlin serves the PNCWA as the past chair of the Government Affairs Committee and as the Washington State Northwest Section President. Before working for the City of Arlington, Caitlin has worked as a wastewater Process Analyst, as a Staff Hydrogeologist, and as an exercise rider at Santa Anita Park, Hollywood Park, Goldengate Fields and Bay Meadows racetracks.

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Arlington, WA

Heather Earnheart

Maintenance & Operations Director

Alderwood Water & Wastewater District

Heather Earnheart is the Maintenance & Operations Director for Alderwood Water & Wastewater District and has worked in the public sector for over 30 years. Heather has served Washington State Northwest Section of PNCWA, holding a variety of positions. heathere@awwd.com, Lynnwood, WA

Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

Drinking Water Regional Internship Program (DRIP): Utility Providers Working Together to Create a Regional Industry Workforce Pipeline

The water and wastewater industries in Oregon are experiencing a shortage in treatment plant and distribution/conveyance operators. According to the EPA, this shortage is anticipated to only worsen in the next ten years, as approximately one-third of drinking water and wastewater operators will be eligible for retirement. This issue is compounded by fewer and fewer young people entering the field.

The recent closure of an Oregon Community College Water/Wastewater Training Program will intensify this issue in the Pacific Northwest, and the fact that several new water treatment plants will be coming online in the coming years will only increase the need for experienced water/wastewater sector staff. This prompted a number of local utilities, consultants, and an Oregon community college to create a working group to focus on solutions to this shortage with the ultimate goal of creating a more robust water workforce in the Pacific Northwest.

The Drinking water Regional Internship Program (DRIP) is currently focused on implementing or exploring the following strategies:

Outreach to increase awareness of water industry careers and boosting recruitment. A website was created through Regional Water Providers to highlight water operator careers: https://www.regionalh2o.org/work-in-water.

Non-credit or other new course opportunities through other community colleges.

Developing remote training opportunities around the state through an Oregon Community College.

Additional grant proposal to create the paid internship program to those currently following the water works career path or for those who just might be interested in a career in water envisioned in DRIP.

Developing a state-approved apprenticeship program.

Monitoring grants related to any of the opportunities.

Overall group updates/coordination.

The presentation will discuss the actions to date, partnerships formed, grants applied for, and the group's plan moving forward. The lessons learned and other accomplishments of the group may encourage the regional wastewater industry to join the DRIP group and creating a water/wastewater industry collaboration for a workforce pipeline!

Presenters

Natalie Reilly

Lead Engineer

Carollo Engineers

Natalie is a Lead Planning Engineer with Carollo in their Portland office. Her 7 years of experience spans wastewater and water planning, including hydraulic modeling, scenario planning, and design optimization.

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Portland, OR

Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 13:00 - 15:00

PNCWA WAVE Program

The WAVE is focused on providing opportunities in the water industry to students and emerging professionals from diverse backgrounds. This program includes a five-part workshop series which focusses on the career paths within the water/wastewater industry, networking, skills development, employment opportunities, and conference preparation. This year, PNCWA has fourteen participants in the program and each participant will present on their experiences and what it's like entering the water industry from their perspectives.

Presenters

Juliana Andrade

Brown and Caldwell, Seattle University

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Seattle, WA

Benjamin Baccellieri

Asset Management Professionals LLC (AMP)

Ben was born and raised in Portland Oregon. He currently works as a Technical Consultant under a private-owned business called Asset Management Professionals (or AMP). He utilizes a comprehensive work strategy to meet the needs and interests of clients. He prioritizes demanding tasks within IT software and development, quality control, and communications. During his free time, he spends quality time with family and friends, enjoys the outdoors, bouldering, and travelling.

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Portland, OR

Nicole Chen

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Seattle, WA

Delandra Clark

Leeway Engineering

Delandra is a Staff Engineer at Leeway Engineering Solutions where she helps municipalities investigate and reduce inflow and infiltration and design pipe rehabilitation projects. Before getting her engineering degree, Delandra spent four years as a data

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Portland, OR

Jasper Clemons

University of Washington

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Seattle, WA

Jasper has a passion for water and wastewater treatment and aims to contribute to their community through this passion. They are currently interning with the King County Wastewat

Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 15:30 - 16:30

Emerging Leaders Venturi-Style: A Case Study for Professional Development

Professional development is widely expected and encouraged in the engineering industry, especially related to technical standards, the latest process equipment, keeping up with regulations, etc. Often overlooked in professional development is leadership. Learn how Consor has embarked on professional leadership development for our water staff through the Venturi program. The cohort is called "Venturi", because a Venturi increases velocity while reducing pressure—applicable also to a group of leaders who work together. As our emerging leaders gain momentum through the program, they pull others along with them through greater knowledge-sharing and mentorship. Our second Venturi cohort began in late 2022, and as leaders, we continue to learn and evolve with our cohort. It is inspiring to see the individuals who have completed the program, and those who are just beginning their journey, grow leadership skills that are often absent in academic curriculum, such as self-awareness, networking, and business planning. Join us to hear from the director of the Venturi program about the development process that goes into each Venturi cohort, and takeaways from the program from a Venturi graduate and a current Venturi leader.

Presenters

Erika Schuyler, PE, PMP

Puget Sound Regional Business Development Manager

Consor

With more than 23 years of experience, Erika focuses on water and wastewater infrastructure, from the planning and preliminary design stage of projects through bidding and construction administration management. As Consor's Puget Sound Regional Business Development Manager, Erika enjoys solving engineering projects using the technical, creative, and interpersonal parts of her brain, making the fast-paced work environment perfect for keeping her on her toes.

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Seattle, WA

Nichole Kruse, PE

Senior Engineer

Consor

Nichole has over 13 years of experience in the municipal water and wastewater industry. She has experience managing design, planning, and on-call contracts, working with clients throughout all project phases to mobilize resources and facilitate successful delivery of projects. Her experience includes leading teams for an array of project types, including water, sewer, and utility design projects. Her varied experience has made her an adaptable team member who excels in communication and multi-disciplinary coordination.

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Seattle, WA

Alexandra Orozco

Senior Marketing Coordinator

Consor

Alex Orozco, a senior marketing coordinator at Consor, brings nine years of experience as a marketing specialist in the architecture, engineering, and construction (AEC) industry. Since joining Consor in 2019, she has applied her marketing degree to manag

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Portland, OR

Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

Empowering Your Staff - What Does It Really Mean?

You've read the management books that tell you a key to your team's success is empowerment, but what is staff empowerment and how can you implement it? In their research on leadership, Kouzes and Posner identify 'Enabling Others to Act' as one of the five practices of exemplary leadership. In this presentation, we will describe what empowerment is, why it matters, and what the benefits are. We will talk about some of the barriers, what happens when something goes wrong, and lay out a guide on how to get started. The presentation will also include other elements of exemplary leadership, such as creating a shared vision that produces a climate for enabling others to act.

We'll explore enabling your team to act through fostering collaboration, creating a climate of trust, facilitating relationships, strengthening others, enhancing self-determination, developing competence and confidence, and organizing work to build competence and ownership. But what if you do all these things and someone you empower and enable makes a mistake – what do you do then? It's the moment of truth – reminding ourselves and our team members that this is a journey and that the focus is on learning and long-term improvement in a supportive environment. We will talk about how all of these elements combine to create empowerment that not only delivers greater job satisfaction for you and your team, but they also deliver better business results.

Presenters

Mark Poling

Senior Consultant

Clean Water Management

Mark is an independent consultant and sole proprietor of Clean Water Management, a consulting firm focusing on utility management. He is a member of the Water Environment Federation WISE Utility Management program team focused on helping utilities provide increased value through business process improvement. He has nearly 40 years of experience at Clean Water Utilities including utility management, water resource recovery facility operation, maintenance, design, and construction.

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Grand Rapids, MI

Hannah Thomascall

Water Reclamation Engineer

Spokane County

Hannah works at the Spokane County Regional Water Reclamation Facility managing the treatment plant. In addition to her work in wastewater, she has experience in regulatory compliance and environmental consulting. Hannah is the current chair of the PNCWA Sustainability and Biosolids Committee, serves on the PNCWA board, and is an active member of six other PNCWA Committees.

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Topic Track: Leadership & Workforce Development

Date: Tuesday - 9/12/23

Time: 9:00 - 9:30

One Plus One Equals a Common Goal: Discussions and Perspectives on Workforce Development From Two Sides of the Workforce

A passionate and consistent workforce is critical to ensuring a "Sound Future for Water" (and the success of other utility and professional industries). Leadership development is an essential component of the success and retention of the water and engineering industry's workforce. But what else? How do we get there? Engaged employees lead to quality work, collaborative teams, and can result in staff that are eager to stay with their employers, and "at least" within the water or wastewater sector. This presentation will offer insight on the importance of leadership and effective training, what works for actual employees, continual personal and professional growth, career development, and additional topics. This presentation will offer information from two differing, but direct personal primary perspectives: Molly's insight as a seasoned engineer in the public sector and Kathleen's experience as a rising professional in the private sector. In addition to their own experiences, they will be conducting a careful survey effort to their colleagues and peers in both the public and private sectors, across gender, diversity, career status, and equity groups, to add to this discussion. We will ask ourselves: What is most important to employee continued growth? How did they develop leadership skills? What factors motivate them to stay? Either at their employer? or in their industry? And even, "What is the biggest challenge in their day-to-day work?" Or, "What do employees feel they need from their work to be successful?" These surveys will be anonymous but collected with meaningful data such as age, career length, gender and race self-identification, and education/experience type. This will help show how these different demographics, personalities, and strengths can be best utilized and fostered in any industry for success. The presentation will provide the audience with insights into what could help lead to the success of the water and wastewater industry's workforce and benefit agencies and employers of all kinds.

Presenters

Kathleen Mannion, P.E.

Lead Engineer

Carollo Engineers

Kathleen Mannion is a Lead Engineer for Carollo Engineers. She has over seven years of experience in water and wastewater conveyance design, focusing on new pipeline design and rehabilitation. Kathleen also has significant experience in wastewater condition assessment field work and planning. In addition to her technical interests, she has a curiosity for leadership and development topics and often feeds that passion through podcasts, non-fiction books, and TED talks. Kathleen holds a Civil Engineering degree from Oregon State University.

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Portland, Oregon

Molly Nause-McCord, P.E.

Wastewater Collections Systems Maintenance Engineer

City of Portland, Bureau of Environmental Services

Molly Nause-McCord is a Wastewater Collections Systems Maintenance Engineer for the City of Portland's Bureau of Environmental Services. She is a professional problem solver and science enthusiast with a passion for STEM, trades, and all education varieties. For over 13 years Molly has worked in sewer and stormwater infrastructure including managing new construction, implementing urgent site repairs, planning and executing condition assessment activities, and general field engineering. Molly holds a Civil Engineering degree from the Oregon Institute of Technology.

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Portland, Oregon

Topic Track: Watewater Treatment

Date: Tuesday - 9/12/23

Time: 14:00 - 15:00

Wastewater Treatment Systems 101

The world of wastewater treatment can be intimidating at first – it's so much more complicated than it seems from the outside. If you're new to wastewater and working at a wastewater or water reclamation facility you are probably familiar with the treatment that your facility does. But what about all the other facilities? Are they all using the same system that you know (and love)? Probably not, each facility is a little different so that they can efficiently and successfully treat the influent they receive. This talk will discuss some basic types of treatment systems so that you can breakdown and categorize a new, unfamiliar facility.

Using examples of facilities here in the Pacific Northwest, we'll cover some of the common wastewater treatment systems, including the Activated Sludge Process (ASP), Membrane Bioreactors (MBR), Moving Bio Bed Reactor (MBBR), and Lagoon Treatment. The components of each treatment type will be described so that you can easily identity a system. Then the different systems will be compared in terms of cost, flow capacity, energy use, footprint size, and nutrient removal. This will allow you to not only identify a facility type but understand why that system was selected. Learning about different treatment systems is a great way to ease into wastewater (not literally) and to understand which technologies could be added to your facility efficiently and economically.

Presenters

Hannah Thomascall

Water Reclamation Project Manager

Spokane County

Hannah works at the Spokane County Regional Water Reclamation Facility managing the treatment plant. In addition to her work in wastewater, she has experience in regulatory compliance and environmental consulting. Hannah is the current chair of the PNCWA Sustainability and Biosolids Committee, serves on the PNCWA board, and is an active member of six other PNCWA Committees.

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Spokane, Washington

Topic Track: Wastewater

Date: Tuesday - 9/12/23

Time: 15:30 - 16:30

Coliphage Detection Methods and Full Scale Viral Quantification

Clean Water Services is onboarding several methods to quantify viral removal, deactivation, and disinfection through our wastewater treatment facilities. Coliphages are viruses specific to E. coli that are commonly used as surrogates for human pathogenic viruses due to their similar fate and transport through wastewater treatment facilities as well as in the ambient environment. The US EPA is continuing the process of developing coliphage as fecal indicators for recreational water quality criteria. Coliphages are thought to be equal to the EPA's currently recommended bacterial indicators when detecting fecal contamination, while providing more direct indicators of viral abundance in treated wastewater than bacterial methods. The current EPA method for quantifying coliphage is laborious and time-consuming, with sample processing requiring several days from starting preparation until final data becomes available. Optimized molecular methods are far faster and higher throughput, greatly reducing staff time required for monitoring and reducing time for data delivery from a scale of days to hours.

The goals of this project were to (1) onboard the EPA method for quantifying coliphage (EPA 1643, culture-based plaque assay) in our Water Quality Laboratory, (2) develop a multiplex droplet digital PCR-based molecular method to quantify coliphage based on published quantitative PCR methods, and (3) identify an optimal viral concentration method to aid in quantifying viruses in dilute samples (e.g., plant effluent). We will share our data on different viral concentration methods to prepare plant effluent for molecular analysis, and describe the influence that the initial viral concentration method may have on final viral quantification. The plaque assay and molecular methods will be used through the spring and summer of this year for influent and effluent characterization.

This presentation will detail the process of onboarding two different viral detection methods: the plaque assay and the molecular method, and a comparison of the data. This work is anticipated to be of interest to facilities looking toward viral detection methods in anticipation of future regulatory limits.

Presenters

Rachel Golda

Operations Analyst - Research

Clean Water Services

Rachel Golda is a researcher at Clean Water Services in Tigard, OR. She has 12 years of experience in water quality research, including assay and instrument design, microbiology, and molecular biology. She received her Ph.D. in Environmental Science and Engineering from Oregon Health & Science University in 2017.

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Topic Track: Collaborative Delivery

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

CM/GC or GC/CM and Progressive Design Build – What Are They, How Do They Work And Are They Right For My Project?

Use of these collaborative delivery models is on the rise as Owners realize the potential advantages of quality-based selection, schedule acceleration and performance-based risk transfer of some of their most complex projects. While these models provide benefits, they are not right for every project or every client, and strong execution of any model is key to success.

This presentation will leverage Water Collaborative Delivery Association (WCDA) training materials designed to educate Owners and Practitioners about collaborative delivery models, get beyond the high-level portrayal of the models, and dig into the nitty-gritty of project execution.

The presentation will compare and contrast to following for these two models:

- Fundamental risk allocation differences

- Project progression from selection of a Contractor/Design-Builder to authorization of construction

- How a Guaranteed Maximum Price Proposal is developed and negotiated

- Guaranteed Maximum Price Proposal (GMP) contents – what does it include?

- How Open Book Pricing works in practice

- Utilization of a Risk Register to create risk transparency

- Definition of the Off-ramp and when it is utilized

- Contract Fundamentals

- High level overview of state statues

A more detailed understanding of how these models are executed will help to refine an Owners' and Practitioners' understanding of whether these models are appropriate 'tools in the procurement toolbox' for a particular organization.

Presenters

Michelle Green

West DB Lead

Jacobs

Michelle Green, PE, DBIA, leads the design-build business for Jacobs' Water Market in the Western US, building on a career of delivering successful water and wastewater projects. She regularly leads

progressive and fixed-price design-build projects, has led design services for construction management at-risk (CMAR)projects, and provided owner advisor services for both CMAR and progressive design-build projects. Michelle is also the incoming president for the Water Collaborative Delivery Association

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Portland, OR

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 10:30 - 11:00

Talk to the People - Water Reuse Communications

Advancing water reuse requires considerable community outreach and engagement. This session will highlight effective water reuse communication engagement efforts with real case examples. Attendees will gain tools and strategies to effectively engage with their communities about projects that span complex science, engineering, and financial topics. This will include examples of building an engagement plan, translating complicated ideas into resident-focused language, and finding ways to make engagement relevant to the audience

Presenters

Natalie Monro

Communications Director

City of Bellingham, WA, Public Works Department

Natalie has worked in communications for public works for 5 years, first at the City of Boise and more recently for the City of Bellingham. She has focused on climate communications, wastewater communications (including the development of a new recycled water program), transportation, and solid waste and recycling education. She specializes in strategic communications planning and is always ready to try a new approach to engaging the community. She holds a Bachelor's Degree in Psychology from the University of Puget Sound and a Master's Degree in Public Administration from Boise State University.

Emily O'Morrow

Program Manager/Senior Associate Engineer

Brown and Caldwell

Emily O'Morrow is a Program Manager/Senior Associate Engineer with Brown and Caldwell Engineering Company in Boise, ID. She has been working in the water and wastewater field for six years and has been most recently working with the City of Boise on their recycled water program. Emily volunteers with several professional organizations, including the Pacific Northwest Clean Water Agencies and Engineers Without Borders. Emily is a graduate of the University of Colorado at Boulder with a degree in Chemical and Biological Engineering.

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 11:00 - 11:30

Water Reuse National Policy Update

In this presentation, staff from the WateReuse Association will provide updates on important federal legislation and regulatory activities that impact water recycling throughout the Pacific Northwest. We will cover the latest legislative developments related to federal appropriations, PFAS, and other important items. We will also provide an update on Executive Branch actions, including the federal Interagency Working Group on Water Reuse, the National Water Reuse Action Plan, PFAS and Build America, Buy America regulations, and the Administration's implementation of federal water recycling programs.

Presenters

Greg Fogel

Director of Government Affairs and Policy

WateReuse Association

Greg Fogel joined the WateReuse Association in January 2019. As Director of Government Affairs and Policy, Greg leads the Association's federal policy work, including its legislative and regulatory advocacy program. Before joining WateReuse, Greg worked for a decade on agriculture policy issues, including issues related to conservation, water quality, and water quantity. Greg is a native of California, completed his undergraduate degree at the University of California, Berkeley, and holds a Master of Science degree and a Master of Public Policy degree from the University of Michigan, Ann Arbor.

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 11:30 - 12:00

Showing What's Possible- Water Reuse Demonstration Projects

Embracing water reuse requires people to shift their mindset about clean water. This session will highlight innovative and creative water reuse demonstration projects that have occurred in the Pacific Northwest and nationally. From recycled water beer to a recycled water supplied public wading pool, attendees will learn about how demonstration projects can be leveraged to change public attitudes and grow support for water reuse. From small, low-budget projects to large projects, attendees will gain new ideas about how demonstration projects can grow public support for water recycling and clean water services more broadly.

Presenters

Jacque Klug

Nutrient Management Coordinator

King County's Wastewater Treatment Division

Jacque Klug is the Nutrient Management Coordinator for King County's Wastewater Treatment Division in Seattle, Washington. Jacque has been involved in all aspects of WTD's recycled water program from supporting customer development, permitting, capital projects, policy development and communication planning efforts. Jacque has worked in the water resource field for more than 20 years and has experience in policy development, planning and permitting on a variety of water issues including water rights, groundwater management, reclaimed water, instream flows, watershed planning and salmon recovery. Jacque has served as the President of the American Water Resources Association Washington State Chapter and is the Past President of the WateReuse Association Pacific Northwest Section.

Seattle, Wa

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 13:00 - 13:30

Contaminants of Emerging Concern through the Water Reuse Lens

The body of research, public concern, and general media coverage relating to contaminants of emerging concern (CECs) is growing rapidly throughout the United States. This session will describe general trends in current research related to CEC occurrence and composition that is most relevant to water and wastewater professionals. Commonly detected CECs in regional water will be described including wastewater, reuse water and stormwater. Using published academic studies and regional studies and sampling, attendees will learn about CECs that might be of most concern to common regional uses of reuse water. Attendees will come away with a greater understanding of CECs, their presence in wastewater, stormwater and natural waters, the pathways CECs enter the environment, and risks and concerns associated with CECs in the environment.

Presenters

Dr. Edward Kolodziej

Professor

University of Washington Environmental Sciences (UW-Tacoma) Civil and Environmental Engineering (UW-Seattle)

Ed Kolodziej is a Professor at the University of Washington with joint faculty appointments at Environmental Sciences at UW-Tacoma and in Civil and Environmental Engineering at UW-Seattle. He also is a Principal Investigator at the Center for Urban Waters (Tacoma, WA) where Ed and his research group use advanced mass spectrometry and hard work to investigate contaminant fate and transport, build effective treatment systems, and insure ecosystem health.

Tacoma, WA

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 13:30 - 14:00

Running an Advanced Water Treatment Pilot to Help Build a Successful Recycled Water Program

The RWP seeks to address multiple drivers impacting Boise's local water supply and resilience including regional growth and capacity needs, climate change, water scarcity, equity and affordability, regulatory compliance, and city-wide sustainability goals. As the RWP addresses these challenges and opportunities, it will demonstrate long-term stewardship over its water resources and build resilience in the face of uncertain futures. Over the next several decades, the RWP will advance the construction of new recycled water facilities, the development of new partnerships, and the adoption of new policies that will work toward the following common program outcomes:

- Increase the WRS system capacity by managing flows and loads through new recycled water facilities.
- Increase the resilience to climate change and water scarcity by diversifying water supply through the production of recycled water.
- Demonstrate regulatory stewardship by anticipating future regulatory needs.

The City of Boise AWT started operation in the Spring of 2023 and will operate for the next 18 months. The pilot is designed to pilot provide information in six key areas including:

1. Transparency in water quality data.
2. Development of financial data.
3. Increased stakeholder confidence.
4. Develop and train workforce.
5. Support regulatory approvals.
6. Develop data to inform design criteria.

The pilot started operation in April 2023 and will be operating for the next 12 to 18 months. The presentation will include information on the startup process, Operation, and how the pilot will help inform the six key areas.

Presenters

Royce Davis

Recycled Water Program Manager

City of Boise

Royce Davis is the City of Boise Recycled Water Program Manager with 20 plus years' experience treating water. Royce has held many different positions including Grounds Maintenance, Lagoon Technician, Wastewater Operator, Wastewater Supervisor, Sewer Superintendent and Plant Manager. While working as an Operator, Royce obtained an AAS in Water Resource Management from the College of Southern Idaho and a BS in Environmental Health from Boise State University. Currently, Royce is working to build the City of Boise's Recycled Water Program. He enjoys family time and all things outdoors.

Boise, ID

Sam Malinowski

Project Engineer

Brown and Caldwell

Sam Malinowski is Project Engineer for Brown and Caldwell with over 3 years' experience in the water and wastewater industry. He studied Mechanical Engineering at the University of Idaho, receiving a bachelor's degree in 2020. His experience includes project engineering for water transmission pipeline construction and providing engineering and design services for a range of water/wastewater conveyance and treatment projects. Outside of work, he likes spending quality time with family and friends, camping, snowboarding, and golfing.

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 14:00 - 15:00

Contaminants of Emerging Concern Monitoring -Lessons Learned and Best Practices

Many utilities are considering or embarking on monitoring programs for contaminants of emerging concern to respond to community concerns about presence of these chemicals in water supplies, including recycled or reclaimed water. However, proceeding with monitoring is a daunting task. Selecting which chemicals to monitor, finding analytical labs to process samples, interpreting and communicating results are challenging tasks. This session will feature a facilitated panel discussion between professionals that have built and implemented CEC monitoring programs. Panelists will provide a brief overview of their work on CEC monitoring and share lessons learned and best practices relating to all aspects of CEC monitoring.

Presenters

Richard Jack

King County Water and Land Resources Division

King County Water and Land Resources Division

Richard has Bachelor's and Master's degrees in environmental sciences with over 25 years of contaminant and habitat assessment experience to help other King County sections investigate and remedy contaminated land and sediments, especially those at habitat restoration sites and flood control facilities. He is the Science lead for the freshwater tissue monitoring program, and an advisor to the wastewater division about wet weather treatment facilities and irrigation using recycled water. Richard serves as a technical expert for the department on chemicals of emerging concern, such as PFAS, hormones and pharmaceuticals. He also provides technical support and collaborates with Seattle King County Public Health and other divisions on department-wide policy issues such as state and federal water quality and cleanup standards and updates to related guidance documents.

Erika Kinno

King County Water and Land Resources Division

King County Water and Land Resources Division

Erika Kinno is the Policy and Research Supervisor for King County Wastewater Treatment Division's (WTD) Resource Recovery, oversees the policy and research efforts for WTD, and supervises the Technology Assessment group. She works closely with the Resource Recovery Energy, Biosolids, and Recycled Water programs to ensure research support and policy development.

Erika confirms that policy is informed by sound scientific study and that research projects are developed to answer real-world questions. She ensures results are distilled into straightforward business language that decision-makers and community members find actionable. Before coming to WTD, Erika was a Policy Liaison for the Hazardous Waste Management Program with Public Health – Seattle & King County and a longtime Aide to former King County Councilmember Larry Phillips.

Originally from Seattle, Erika is fluent in Japanese and lived in Japan. While there, she earned a Master of Science in International Agricultural and Environmental Science from the Tokyo University of Agriculture and Technology. Erika also holds a bachelor's in Environmental Policy and Assessment from Western Washington University.

Dr. Scott Mansell

Clean Water Services, OR

Scott is a Principal Engineer in the Research and Innovation Program at Clean Water Services in Hillsboro, Oregon. Scott’s career in research and engineering has covered an exceptionally wide range of subject areas within the One Water arena including was

Jennifer Hooper

CDM Smith

Jen Hooper is a professional environmental engineer with nearly 15 years of consulting experience. She received a BS from the University of Idaho in Biological Engineering and an MS Biological and Environmental Engineering from Cornell University. She is

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 15:30 - 16:30

Reuse Regulator Session and Q&A

Regulations for recycled water have historically been driven from a state level which leaves a regulatory framework that is unique for each state. From a regulatory standpoint water reuse will be discussed from the regulating in the Pacific Northwest: Oregon, Washington, and Idaho. Additionally, other states will be participating to discuss their considerations and differences from the Pacific Northwest. The rules and considerations for protection of public health and the environment from each state's perspective will be discussed along with questions from the moderator and the audience.

Presenters

Pat Heins

Oregon Reuse Regulator

Pat is currently the state coordinator for Oregon Department of Environmental Quality's Biosolids and Recycled Water programs. He also serves as a permit writer for state wide general permits. He has more than 20 years' experience in contaminant fate and transport, hazardous materials and waste stream management for municipalities and private industries.

Tom Rackow

Idaho Reuse Regulator

Tom has a B.S. degree in Biological Systems Engineering from the University of Idaho with an emphasis on soil and water conservation and irrigation system design. He received his M.S. degree in Environmental Engineering from Idaho State University with an emphasis in wastewater treatment system design and water quality modeling. Tom is a licensed Professional Engineer in the State of Idaho. Prior to DEQ Tom had 13 years combined experience in the private sector where his efforts focused in electro-mechanical design and manufacturing; design and manufacturing of non-intrusive flow meters for agricultural, food processing, mining, and other heavy industrial markets; research and development of precision-application irrigation systems; and the design and construction of agricultural irrigation systems throughout central and southern Idaho. Tom has spent the last 16 years as an engineer for Idaho DEQ in the Idaho Falls Regional Office. His efforts focus on water reuse facility design and operation, biosolids and septage management, engineering plan and specification reviews, and lagoon seepage testing. While at DEQ, Tom has served on a variety of committees working with municipalities, industries, consultants, academia, and the public to develop design and operational guidelines for water reuse, biosolids, septage, and seepage testing. Tom also enjoys the opportunity to teach wastewater operator courses across the state to help prepare operators for their certification exams.

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 8:00 - 8:30

Water Reuse Association - National and Regional Update

This session will provide an update of water reuse news and accomplishments from a national and regional perspective. Attendees will learn about federal advocacy to advance water reuse and the communication tools, peer networking and reuse technical learning opportunities provided by the WateReuse Association. The session will then shift gears to highlight accomplishments and work within the Pacific Northwest to advance reuse through advocacy, legislation, and communications in the states of Oregon, Washington and Idaho, including the second successful Oregon Water Reuse Summit held in June 2023. Attendees will learn about advocacy, networking and information sharing opportunities for water professionals in the Pacific Northwest.

Presenters

Patricia Sinicropi

Executive Director

WateReuse Association

Patricia Sinicropi is the Executive Director of the WateReuse Association, an organization that advocates for laws, policy, and funding to increase water reuse and develops technical education and communications tools to support water reuse practitioners. Patricia has over two decades of experience as a policy expert and advocate on water-related issues in Washington, DC. Prior to joining the WateReuse Association, she served as Senior Legislative Director for the National Association of Clean Water Agencies (NACWA) and as Legislative Counsel to the Water Environment Federation (WEF). Prior to joining WEF, Pat represented the Rural Community Assistance Partnership (RCAP), an organization providing technical assistance to small, rural communities on drinking water and wastewater infrastructure needs. She also served in the Clinton Administration as Deputy Director at the President's Council on Sustainable Development for the National Town Meeting on Sustainable America and as Special Advisor on Livable Communities to Deputy Secretary of the U.S. Department of Agriculture.

Heidi Tichenor

President

WateReuse Pacific Northwest Section

Heidi Tichenor is the Oregon Local Leader for Brown and Caldwell supporting its staff and service to clients throughout the state. She volunteers with several professional organizations, including serving as education committee chair and board member for the Oregon Association of Clean Water Agencies. Heidi has a 24-year background in strategic planning and communications for water and wastewater

projects and programs, Tichenor's experience includes stakeholder engagement support for large-scale urban water supply solutions, including water reuse projects involving complex community outreach strategies. As project manager, she has led stakeholder coordination, strategic visioning and planning, and outreach implementation on some of the most innovative water reuse programs in the West.

Topic Track: WateReuse Association

Date: Tuesday - 9/12/23

Time: 8:30 - 9:30

Drivers for Reuse Across the Pacific Northwest

Communities across the Pacific Northwest face a diverse set of water resource challenges. From developing additional water supplies to managing wastewater under tightening discharge limits, communities are exploring and selecting water reuse to meet their water resource needs. This session will present case studies from around the Pacific Northwest on how water reuse is being assessed, pursued and the partnerships built to advance water reuse. The session will include short case studies and a moderated discussion with pre-developed questions to provide a robust dive into the technical, economic, and social aspects of assessing and advancing water reuse in a variety of community settings.

Presenters

Jared Kinnear

Water Reuse Program Manager

Clean Water Services, OR

Jared is the Reuse Program Manager at Clean Water Services. He is a Professional Wetland Scientist and has worked on design, permitting, and implementation of wetland mitigation and stream enhancement projects throughout the Pacific Northwest for over 20 years. Jared has been with Clean Water Services for over 12 years and manages the Fernhill Wetlands Natural Treatment System, Reuse Program, and Biosolids Program. Fernhill Natural Treatment System is part of more than 750 acres in Forest Grove owned by Clean Water Services for water resources management. Fernhill utilizes natural treatment systems, or wetlands, to improve water quality by removing nutrients, cooling, and naturalizing the water after conventional treatment. The Reuse program currently irrigates 1 mgd, but has plans to expand the program exponentially to meet water quality goals for the Tualatin River. Clean Water Services biosolids program produces approximately 11,000 dry tons of Class B biosolids for beneficial land application on over 25,000 agricultural acres across different ecoregions in Oregon.

Nick Green

President

Catalyst Public Policy Advisors, LLC

Nick is the President of Catalyst Public Policy Advisors, LLC, an advisory firm for rural agencies and investors centered on public-private developments. Before founding Catalyst, Nick was the city manager of John Day, Oregon, from 2016-2022, where he raised over $30 million in public investment capital for housing and community development projects, including over $10 million to finance a new water reclamation facility and brownfield redevelopment project in John Day called the John Day Innovation

Gateway. Nick’s work on this project has won multiple awards, including the Western Planner President's Award (2021) for planning innovation. Nick's prior work experience includes consulting with Booz Allen Hamilton and Jacobs, where he managed a $31 billion technology investment portfolio. Nick began his career as an intelligence officer in the Defense Intelligence Agency. He has an MPA from the Evans School of Public Policy and Governance and resides in John Day with his wife, Morgan, and two children, Kaden and Penelope.

Topic Track: Exhibitor Showcase

Date: Tuesday - 9/12/23

Time: 10:05 - 11:45

EXH-3: Solids Processing: Cambi – Meeting Today's Challenges for Biosolids Treatment, inDENSE – Using Gravity to Solve Operational Problems Wthin your Biological System, Anaergia – Hungry for More: Leveraging High Solids Digestion, Thermal Process Systems

Cambi: Wastewater treatment plants are facing a challenging future, trying to meet challenges including odor, reducing greenhouse gas emissions, potential PFAS regulations, and rising capital and operating cost. It is possible to design and operate a facility that meets these challenges by following some simple rules for facility design including: Provide significant reduction in biosolids volume; Produce energy from the biosolids process to provide surplus energy to run the facility; Reduce offensive odors during processing and recycling of the treated solids; Allow for flexibility in the treated solids for recycling and reuse. Thermal Hydrolysis systems are achieving all of these objectives at facilities across North America. The design and results of several facilities will be reviewed and presented. inDense: Presenter will be co-presented (just in case manufacture has logistical issues) by Jason Boyd from World Water Works (WWW) and Chris McCalib president of TEC. Jason is the West Coast Regional Sales Manager for WWW and has been in that capacity for over 8 years. Prior to WWW Scott has been in the wastewater field in various process design capacities ranging from SBR's, conventional activated sludge, and MBR's. Chris McCalib has been in the wastewater industry since 1992 and ran facilities between Seattle and Tacoma in Washington state. Been a manufacturer representative for the last 9 years supporting biological engineering designs throughout the PNW. TEC is still active in running MBR facilities in the region under his supervision. The technology being presented would be the inDENSE gravitational sludge intensification offering from WWW (brochure attached above). This technology offers several biological advantages to achieving process control, improved SVI's, clarifier capacity, enhanced BNR, and granular sludge intensification. This technology is extremely retrofittable to almost any secondary process and is viewed as the least cost per gallon of any sludge intensification offering in the market. Anaergia: Anaergia's Omnivore High solids digestion system is comprised of (1) Anaergia high solids OmniMix mixers (with service box) and (2) Anaergia sludge screw thickener, to remove excess water from digester, increase organics loading, and improve VSR. As retrofit, Omnivore triples digester capacity within existing volume, or as new construction, requires 1/3 the footprint and significantly reduces CAPEX. Thermal Process Systems: Traditional Anaerobic Digestion processes can create undesirable challenges at WWRFs. Nitrogen recycle from dewatering can have a significant impact on the overall loading to the facility and Phosphorus released under anaerobic conditions can negatively impact dewatering performance. These problems increase chemical and energy costs and create many operational challenges. By adding an Acid Phase Digester before and an Aerobic Reactor after the Anaerobic Digester, some significant improvements in plant, digester and dewatering performance can be realized. These proven processes are well- established and employed (often independently) at several facilities but, when they are used in concert with the addition of a recycle loop, the solids process effectively becomes sidestream nutrient removal. Managing these nutrients in solids processes that are optimized for the desired biology has other side-effects including decreased H2S production, reduced odor and more robust digester performance. PureAir Filtration: The V-Bank System for carbon vessels have been around

a long time, but airflows in projects are rising as projects become more ambitious. The V-Bank system is the most efficient system for maximizing airflows, footprint and ease of change out.

Presenters

Paul Christy

General Manager

Cambi

Mr. Christy has over 40 years' experience in water and wastewater treatment systems. He has over a dozen patents related to both water and wastewater treatment systems. He has served as General Manager for Cambi in North America since 2013.

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Chris McCalib

President

TEC

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Kent, WA

Margaret Laub

Development Manager

Anaergia

Margaret leads project development for Anaergia, partnering with municipal wastewater agencies to enhance digestion and biogas utilization. Margaret has a degree in Environmental Engineering from Harvard University and is a Certified Energy Manager.

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Carlsbad, CA

Matthew Williams

Regional Sales & Product Manager

Thermal Process Systems, Inc.

Matt Williams is a Regional Sales Manager and Anaerobic Product Manager at Thermal Process Systems (TPS) and has worked in the water and wastewater industry for over 18 years, serving in various roles in manufacturing and consulting. Matt earned his Bach

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Heber City, UT

Tim Jameson, Director of Sales, PureAir Filtration, tjameson@pureairfiltration.com, 770-815-2431, Atlanta, GA, Tim Jameson is the Director of Sales for PureAir Filtration out of Atlanta, GA. He has worked at the company for over 10 years and specializes

Topic Track: Exhibitor Showcase

Date: Tuesday - 9/12/23

Time: 13:00 - 15:00

EXH-4 – Liquids Processing: Vulcan Industries - Optimizing Bar Screen Screenings Removal; KUBOTA Membrane USA - Basics of Membrane Bioreactor (MBR) Technology and Recent Case Studies in NW; AWC Water Solutions - Dissolved Air Flotation (DAF) for Treating

Vulcan Industries: Bar Screens are often thought of as an inefficient means of screenings removal. However, spending a bit of time design optimizing the channel configuration can go a long ways to removing pesky items in the waste stream like wipes. Kubota Membrane USA: This course will cover the basics of Membrane Bioreactor (MBR) process including how to design, operate and troubleshoot. MBR effluent meets the class A recycled water and are reused in multiple application around the world. It also meets extremely low Nitrogen and Phosphorus regulations, which makes the MBR technology a viable option in multiple applications. Kubota will provide couple detailed MBR project case studies in the Northwest. AWC Water Solutions: AWC has nearly 25 active DAF plants in the PNW. The technology has been so prolific here because it is perfect for treating the kinds of surface waters we have, which are laden with fine solids, organics and algae. Few other technologies can meet potable water quality requirements with such high recovery, low operating costs and as little waste. This presentation will dive into the details of the DAF's performance at these many operating facilities and will highlight an active project in Wrangell, Ak where a DAF plant is finally being built nearly 7 years after piloting confirmed DAF was the best technology for the job. Gross-Wen Technologies: The Revolving Algal Biofilm (RAB) system uses vertically oriented conveyor belts that grow algae on their surface. As the algae grow, it consumes nitrogen and phosphorus from the wastewater while it uses sunlight and carbon dioxide from the atmosphere to rapidly grow algae biomass. The algae produced during this process can be harvested and used to make fertilizers, bioplastics, and biofuels providing an additional revenue stream alongside an already more economical system. The City of Pasco, WA is currently implementing the RAB system at its Process Water Reuse Facility following anaerobic digestion. Veolia Water Technologies: Veolia's ZeeLung MABR technology allows existing facilities the ability to increase or even add nitrification if the facility does not already nitrify in a simple and cost-effective manner. USGI: On-site hypochlorite generation (OSHG) systems for disinfection have seen an increased adoption rate in the last decade as water and wastewater utilities continue to grapple with the onerous complexity of risk management plans (RMPs) in the case of gas chlorine disinfection and the operational or cost challenges of using bulk 12.5% sodium hypochlorite for disinfection. OSHG systems which have been utilized in North America since the early 1990’s use electricity to convert simple table salt (sodium chloride) into 0.8% (8,000 ppm) bleach or sodium hypochlorite.

Presenters

Tim Miller

Regional Sales Manager

Vulcan Industries

Wastewater sales professional involved in wastewater industry nation wide over the last thirty years.

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Missouri Valley, IA

Hiro Kuge

Technology Manager

KUBOTA Membrane USA

Hiro Kuge is the Technology Manager of Kubota Membrane USA and is in charge of engineering group in the US. He has 19 years of designing, constructing, commissioning and troubleshooting MBR plants around the world.

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Bothell

Ryan Harvey

Senior Business Development Manager

AWC Water Solutions

Professional Engineer with 14 years of experience and a passion for providing communities with safe, potable water in the most practical and economical way, as well as protecting our environment from contaminated waters that are produced in residential co

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Langley, British Columbia

Max Gangestad

Chief Operating Officer

Gross-Wen Technologies

Max Gangestad is the Chief Operating Officer and Co-Founder at Gross-Wen Technologies. During my tenure at Gross-Wen Technologies, I am responsible for overseeing operations and strategic initiatives, driving business growth, and ensuring the company's su

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Ames Iowa

Chris Allen, Western Regional Director, Veolia Water Technologies and Solutions, chris.allen@veolia.com, 503-307-2238, Boise, ID, Chris has over 23 years of experience in the renewable resources market. Chris is the Western Regional Sales Director for Veo

Topic Track: Exhibitor Showcase

Date: Tuesday - 9/12/23

Time: 15:30 - 16:30

EXH-5 – Pumping Systems: Landia – How a Pump Modification Bridged a Gap Between Costly FOG/Scum Problems in Lift Stations, KSB – Semi-Open, Non-Clog Impellers for Wastewater Pumping, EnviroMix - Compressed Gas Mixing for Optimized Nutrient Removal

Landia: Floating thick mats of scum and grease combined with the increased presence of wet wipes has made lift station maintenance a costly line item. Many manhours are spent by personnel busting scum layers just to gain access to duty pumps. A simple pump modification added to wet wells in four different cities resulted in the total elimination of scum mats and significantly reduced the frequency of pump clogging. This short booth presentation will present the simple modification implemented. KSB Inc.: KSB'S patented Amarex ARX submersible pump with D-max technology was specifically developed for reliable operation and high efficiency, even when faced with the challenge of processing modern day 'flushable materials', and difficult contents such as long, fibrous materials, heavy solid concentrations, and other materials found in today's municipal and industrial waste streams. EnviroMix: Highly efficient compressed gas mixing technology for optimized biological treatment, nutrient removal and tank/channel mixing that reduces energy consumption, simplifies maintenance, and optimizes process conditions, enabling highly scalable and flexible operations.

Presenters

Art Savage

Landia, Inc.

Art Savage holds two master's degrees and has worked in the wastewater industry since the 1980s. He was hired right out of school to be a pilot plant technician with the Environmental/Energy Division of Air Products and Chemicals, Inc. in Allentown, PA. He is now employed by Landia, Inc. Landia manufactured the world's first Chopper Pump (1950). In addition to chopper pumps, Landia manufactures AirJets, Submersible and Side-Entry Mixers, and GasMix systems for digestion. Art is married with one son and lives near Fort Worth, TX.

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Burleson, TX

Ramin Ghasemi

KSB Inc.

Mechanical Engineer. Specialized in centrifugal pumping Solution in Water and Waste Water segment.

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Scott Mulinix

Director of Regional Sales

EnviroMix

Scott Mulinix has nearly 20 years of experience in the wastewater industry. Throughout his career, Scott has worked closely with municipal and industrial end-users, consulting engineers, and manufacturer's representatives to support the sale of water and

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Charleston, SC

Topic Track: Emerging Technologies

Date: Tuesday - 9/12/23

Time: 17:30-18:00

Emerging Industy Technologies and Solutions 2.0

Join us for an enlightening program that delves into the forefront of the wastewater treatment industry. Discover the latest breakthroughs in emerging technologies and cutting-edge updates that are revolutionizing wastewater treatment. From advanced methods and smart monitoring systems to eco-friendly solutions, this session offers a glimpse into the future of sustainable wastewater management. Don't miss the opportunity to explore the exciting developments shaping the way we treat and protect our most vital resource – water.

Subdisciplines will be focused on:

1. Liquids Treatment
2. Solids Treatment/Handling
3. Process Controls
4. Pumping Systems
5. CSO/Stormwater Management

Presenters

Blue-White, Owens Pump & Equipment, JBI Water and Wastewater, Infosense, Beaver Equipment, Electro-Chemical Devices

Peristaltic and Diaphragm Chemical Feed Pumps, Collections system plugging solutions, Moleaer NanoOxidation, SL-RAT Sewer Line Rapid Assessment Tool, Elo-Vac-P (Struvite Mitigation), Rotork Electric Actuators, Industrial Liquid Analyzers

Topic Track: Exhibitor Showcase

Date: Tuesday - 9/12/23

Time: 8:00 - 9:00

EXH-1: Stormwater: Old Castle - Stormwater Maintenance Frequency Assessment of a High-Rate Filter in King County, WA, ADS - Know Your Flow to See, Understand and Act, CIP Construction Technologies - Solving Infiltration and Corrosion Problems in Sanitary

Old Castle: A stormwater maintenance frequency assessment of a high-rate filter was conducted in a street located in King County Washington from September 2020 to January 2022 (Herrera, 2022). The system had a routine maintenance event followed by hydraulic and sample collection to determine maintenance frequency. The presentation will discuss the study site, sample methods, results and conclusions from the investigation. I will also have an open discussion on visual inspection cues for determining maintenance with horizontal treatment systems associated with road sanding events. ADS: Wireless level and flow monitoring solutions for managing stormwater and combined sewer systems, and near real-time alerting of utilities and consultants of high levels and/or pending CSOs. Data delivered wirelessly to ADS' PRISM web-based software can used for monitoring level only or quantifying flow for purposes of event notification, overflow reporting and overall stormwater management purposes including model development and/or calibration. CIP: Formed in Helena, MT in 1993 the company began installing Cured-in-Place Manhole (CIPM) lining systems in 1997. We have extensive experience with unique and diverse situations, including but not limited to manholes, square structures, deep wetwells and lift stations, culverts, remote installations, and heavy infiltration and deterioration problems. Cured-in-place liners can often be the most practical solution both cost-wise and length of installation time and is almost always the most permanent method. They stop infiltration and provide structural integrity. The multiple layers of fiberglass provide needed structural integrity and the PVC membrane acts as a barrier to H2S gas. It can usually be installed without bypass pumping and in a matter of a few hours. The entire interior of the structure receives coverage. CIP’s intelligently-designed process fortifies existing infrastructure and is certified to last up to 100 years, unrivaled by any product in the marketplace.

Presenters

Sean Darcy

Stormwater Consultant

Oldcastle Infrastructure

Sean Darcy has 25 years of experience in the aquatic ecology and stormwater field. Research has been done traversing land and stream, floating or sinking, and throughout the ultra-urban landscape. Sean's current role is to assist in the design of stormwater facilities with maintenance in mind.

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Auburn, WA

Neil Volk

ADS Environmental Services

Neil has been with ADS for over 30 years primarily as a senior project manager until taking on the position of business development manager in early 2022. Neil studied forestry and natural resources at the college of the redwoods and currently holds a PMP credential from the project management institute.

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Tukwila, WA

Jim Swain

President

CIP Construction Technologies, Inc.

Since 1997, Jim Swain, founder of CIP Construction Technologies, has overhauled and transformed just about every kind of sewer degradation project imaginable. CIP's patented, proprietary technology has afforded Jim one of the highest customer satisfactio

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Kalispell, MT

Topic Track: Exhibitor Showcase

Date: Tuesday - 9/12/23

Time: 9:00 - 9:40

EXH-2: Process Controls: Danfoss Drives- Drive Application for Pump Stations, HACH Company- Liquid Phase Measurement of Hydrogen Sulfide for Odor and Corrosion Control

Danfoss Drives: This presentation will review how variable frequency drive use on varying demand loads can reduce energy and CO2 levels. A demonstration on intelligent drives controlling two pieces of rotating equipment will be shown. Specific pump application features such as condition based monitoring for predictive maintenance and de-ragging will be discussed. HACH: Corrosion and odors are a constant challenge for many wastewater treatment systems. Sewer collections systems, manholes, wet wells and wastewater treatment plant headworks are some common problem areas. Hydrogen Sulfide (H2S) is the offending gas that causes pipe and infrastructure degradation, odors, and safety concerns. There are many ways to deal with Hydrogen sulfide from odor scrubbing systems to a host of chemical treatments. The challenge is to know where the odors are formed, how much chemical to add, and how efficient removal is due to the highly volatile nature of H2S. Traditional treatments rely on very difficult lab testing or inconsistently representative air testing. In-situ, real-time liquid phase H2S monitoring turns out to be a more accurate and predictive measurement as we'll discuss some real-world data and application of an innovative measurement technology principal.

Presenters

Doug Ryan

Western Regional Sales Manager

Danfoss Drives

Doug has been in the pump and controls industry for over 30 years providing control solutions that reduce energy costs, decrease down time, and minimize infrastructure failures.

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Glendale Arizona

Adam Jennings

Application Development Manager

HACH Company

Adam Jennings

Applications Development Manager

Hach Company

Adam's background and foundation is in wastewater operations and management, having previously worked as an operator, operations supervisor, and plant manager.

His professional operations licenses include: Class IV Wastewater Treatment, Class IV Collection System, and Class I Wastewater Lab Analyst.

He started in the wastewater field 18 years ago and quickly moved into operations. In operations, he supervised two facilities during changing regulatory landscapes with new stringent nutrient limits on the horizon. Having sat in the plant manager role, and now with Hach for the last three years he hopes to bring some new perspectives and foster creative thinking and plant optimization. He is a home-brew aficionado and enjoys adventuring with his kids in the mountains of Idaho.

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Garden City, Idaho

Topic Track: Model Based Decision-Making

Date: Wednesday - 9/13/23

Time: 10:30 - 11:00

Model Based Decision Making: The Impacts of Re-development on Tacoma's Collection System and Pump Station Operations

The Southwest portion of the City of Tacoma's (City) Central Treatment Plant (CTP) collection system is experiencing ongoing redevelopment that includes both large proposed projects and smaller projects from continued steady population growth. This portion of the collection system flows by gravity to the South Tacoma Pump Station (STPS) and is then conveyed to the CTP. STPS is due for rehabilitation based on equipment age in the coming years.

This presentation summarizes updates of Tacoma's collection system hydraulic model and describes model use to answer questions regarding large redevelopment projects and pump station design optimization. Several possible development scenarios were projected and evaluated in the hydraulic model. A sensitivity analysis for different development types was conducted with respect to system performance criteria balancing flows, piping improvements, pump station capacity and operations.

The City provided the most recent field verified system GIS data, pump station settings, and local flow monitoring in the key basins. This information was added to Tacoma's CTP model, making the model completely up to date. Projected flow scenarios were developed for an old Airfield that is being re-developed along South Tacoma Way. Re-development of a high density 400-unit development on 6th Avenue, and the Mall at South 48th Street were also included in the analysis. The model was used as a tool to recommend future pipe upsize and help size the new planned conveyance system to meet the City's performance criteria.

Additionally, the hydraulic model was used to evaluate the STPS operations during both a large rain on snow storm in January 2022 and the City's collection system design storm. Model results were compared against the system performance criteria when either 4 or 5 pumps are operating at the current STPS. This was completed for the existing system configuration and for the proposed piping changes identified for the Airfield development. Operational changes with the current pumps were tested to improve system performance during storms. Lastly, pumping capacity for pump replacement were recommended that balanced system performance both upstream and downstream of the STPS, based on the recent large January 2022 storm and the City's design storm.

Presenters

Max Mozer

Engineer

Carollo Engineers

MAX MOZER has 5 years of experience in planning and hydraulic modeling. Many studies have focused on gravity conveyance systems using modeling tools that are commercially and publicly available,

including products from EPA, Bentley, Autodesk, and DHI. Collection system modeling has included storm, sanitary and combined systems, with tasks ranging from master planning to risk analysis and support of detailed facility design.

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Seattle, WA

Ed Wicklein

Chief Technologist

Carollo Engineers

ED WICKLEIN has 25 years of experience in design and analysis of hydraulic facilities using numerical models. Many studies have focused on gravity conveyance systems using modeling tools that are commercially and publicly available, including products from EPA, Bentley, Autodesk, and DHI. Collection system modeling has included storm, sanitary and combined systems, with tasks ranging from master planning to risk analysis and support of detailed facility design.

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Seattle, WA

Topic Track: Model Based Decision-Making

Date: Wednesday - 9/13/23

Time: 11:00 -11:30

Gothenburg's Digital Twin – Helping Reduce CSOs And Flooding, Stabilize Wastewater Loads And Make More Efficient Use Of Existing Infrastructure

The Gothenburg region was able to address emerging challenges within its sewerage system by developing a digital twin. Gothenburg, located on Sweden's west coast, faces many of the same challenges faced in the Pacific Northwest. Gothenburg, one of the rainiest cities in Sweden, experiences heavy rainfall causing large loading variations to its central Rya water resource recovery facility (WRRF). Approximately 25% of the sewers in the City are combined, increasing the risk of flooding and discharge of untreated wastewater into the surrounding ecosystem.

Gryaab AB, the regional wastewater utility serving Gothenburg and surrounding municipalities, owns and operates the Rya WRRF and the tunnel system transporting wastewater to Rya WRRF. Gryaab saw the potential and developed a digital twin to help better manage its sewerage system, including:

- Developing a detailed H&H model of the tunnel system and catchment area
- Incorporating all controllable devices (gates, pump, etc.) in the digital twin
- Incorporating weather forecasting in the simulation
- Development of Forecast-on-Demand features
- Development of operational strategies to mitigate the risk of urban flooding and minimize CSO discharges

Deployment of the digital twin allowed Gryaab to get better real-time information about events in the tunnels and accurate predictions of potential issues and peak pressure on the system. This allowed them to optimize the overall system performance. Simulations indicate that yearly CSOs may, ideally, be reduced by 65%, and bypass volume at the WRRF by 85% through dynamic operation of CSO sites and increased utilization of tunnel volumes. Simulations for years 2035, 2050 with various climate and population scenarios helped understand how and when to plan for expanding WRRF capacity.

The digital twin allows Gryaab to act proactively. Staff can make decisions based on comprehensive, real-time data and prognosis and even allow direct implementation of the digital twin's suggested setpoints in the SCADA-system. The digital twin is used for training in various scenarios so that staff is better prepared for future critical situations and for making better informed decisions. In short, the digital twin is used for gaining better real-time control and improving the operation of the sewer system, both today and in the future.

Presenters

Venu Kandiah

Senior Project Manager

DHI Water and Environment, Inc.

Venu Kandiah is a civil engineer with background in water, wastewater and stormwater infrastructure modeling planning, engineering, and risk assessment. He has eighteen years of work experience in the areas of hydrologic and hydraulic modeling (including simulation, optimization and visualization), integrated 1D/2D modeling, development and maintenance of real time decision support systems and digital twins, master planning, risk assessment and emergency response planning, and design of water, stormwater, and combined sewer and wastewater infrastructure systems.

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Snohomish, WA

Topic Track: Nutrients

Date: Wednesday - 9/13/23

Time: 11:30 - 12:00

Lessons Learned and Best Practices from over 20 years of Nutrient Removal in the Chesapeake Bay and Mid-Atlantic

Many water resource recovery facilities (WRRFs) in the Chesapeake Bay and mid-Atlantic region have completed improvements to address low effluent nutrient requirements over the last two decades. Many utilities in this region have to meet total nitrogen (TN) below 3 mg/L and total phosphorus (TP) below 0.2 mg/L.

The extensive experience in the Chesapeake Bay and mid-Atlantic regions uniquely positions utilities facing new effluent nutrient limits to learn from their peers' experiences and adopt best practices and technology advancements for nutrient removal. This presentation will introduce key design considerations and best practices with a focus on nutrient removal experiences and introduce advances in nutrient removal technologies. Specific topics, including actual case studies, will include:

- Optimizing biological nutrient removal (BNR) Reactor Design – Providing flexibility in anaerobic, anoxic, and aerobic zones to address seasonal variations in temperature and loads allows fine-tuning of nutrient removal processes and can reduce overall volume. Providing deoxygenation zones prior to nitrified recycle pumping or unaerated zones optimizes carbon usage for nutrient removal. Proper baffle wall design to allow foam transport and surface wasting.

- Optimized Aeration System Design – Oversized aeration systems increase energy and chemical costs to meet effluent nutrient limits. Aeration systems need to be designed for flexibility over a range of variable load and environmental conditions, with a focus on maximizing turndown to avoid overaerating and allowing adoption of advanced aeration control strategies such as ammonia-based aeration control (ABAC).

- Carbon Management for Chemical Reduction – Providing flexibility in BNR reactor design and low dissolved oxygen operation improves utilization of influent carbon for nutrient removal. Many WRRFs in the region were designed to meet effluent TN limits through both BNR and denitrification filters, which require methanol addition. As WRRFs optimized their BNR processes they have become less reliant on denitrification filters, and many have discontinued methanol feed to filters.

- Next Generation Nutrient Removal – New "intensification technologies" such as aerobic granular sludge (AGS) and densified activated sludge (DAS) reduce footprints and capital costs of nutrient removal improvements. Shortcut nitrogen removal approaches such as deammonification and partial denitrification-anammox (PdNA) to lower the carbon and energy inputs required for nitrogen removal.

Presenters

Ron Latimer

Vice President

Hazen and Sawyer

Ron Latimer is a Vice President and a national wastewater process lead with Hazen and Sawyer. He has over 25 years of experience in wastewater process design with specialization in nutrient removal, nutrient recovery, process optimization and process modeling.

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Atlanta, GA

Topic Track: Nutrients

Date: Wednesday - 9/13/23

Time: 12:00 - 12:30

A Scientific and Regulatory Framework for Adaptive Management of Nitrogen Loading to Coastal Waters

Many coastal waters in the US and worldwide are adversely affected by excessive nitrogen loading; however, high costs and scientific uncertainties can impede stakeholder agreement regarding the degree of nitrogen control necessary. This paper presents a case study of how regulatory agencies, utilities, and environmental groups charted a path forward for reduction of nitrogen loads to the Great Bay estuary in New Hampshire. This network of tidal rivers, bays, and harbors has experienced historical declines in seagrass. In the mid 2010s, agencies attempted to impose a nitrogen criterion that would drive stringent limits on municipal wastewater treatment facilities (WWTFs). This attempt stalled after an independent expert panel found insufficient scientific evidence that the proposed criterion would achieve the desired ecological benefits. At this impasse, utilities preferred optimization and voluntary nitrogen reductions, whereas other stakeholders continued to advocate low, enforceable nitrogen limits.

Ultimately, the parties negotiated a resolution that culminated in USEPA's issuance of the Great Bay Total Nitrogen General Permit in 2020. This permit currently covers thirteen WWTFs, with the option for additional utilities to obtain coverage in the future. The first 5-year permit term includes enforceable nitrogen load caps, intended to limit the aggregate nitrogen loading to 100 kg/year per hectare of estuary surface area. The general permit does not include nitrogen concentration limits, and the load limits are expressed as rolling seasonal averages. This approach provides operational flexibilities to the WWTFs and allows some utilities to postpone upgrades by staying under design flow rates.

A key element of the general permit is a utility-authored adaptive management plan that charts a course for future permit terms. Under this plan, the utilities support regional water quality monitoring and scientific studies to improve our understanding of the role of nitrogen and other stressors in the Great Bay. Brown and Caldwell serves as the technical representative to the municipal alliance, advocating sound science and reasonable regulatory interpretations of the ongoing studies. This paper will describe ongoing nitrogen-seagrass studies and how those results are being considered for future general permit terms.

Presenters

Clifton F. Bell

Technical Leader for Water Quality

Brown and Caldwell

Clifton Bell is Brown and Caldwell's Technical Leader for Water Quality, and has 30 years of experience in water quality management, modeling, and planning. A former hydrologist with the U.S. Geological Survey, he focuses on linking the scientific, regulatory, and implementation aspects of water quality

challenges. Clifton has helped utilities improve large scale nutrient control programs across the country, from the Chesapeake Bay to Hawaii.

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Richmond, VA

Topic Track: Digital Tools/AI

Date: Wednesday - 9/13/23

Time: 8:00 - 8:30

Demystifying Machine Learning for Water Professionals

Machine learning has been transforming many fields, including water resource management, where it has the potential to revolutionize how we collect, process, and analyze data to inform decisions. However, the field of machine learning can seem intimidating and out of reach for those without programming or data science backgrounds. In this presentation, we aim to demystify machine learning and encourage broader utilization of these tools by water resource professionals.

We will provide a brief overview of machine learning concepts and applications relevant to water resource management. We will also discuss recent developments in automated machine learning tools, which make it easier for people without coding experience to apply machine learning techniques to their data.

We will showcase soft sensor example and how machine learning can be used to make predictions of certain unmeasured variables based on the real-time measurements of other correlated variables. In addition, we will highlight publicly available machine learning resources, including software packages and online courses, that are useful resources for learning and applying these techniques within the environmental engineering field.

Finally, we will discuss the future of machine learning in the water resource and utility sectors, highlighting the potential for improved accuracy and efficiency in decision-making, cost savings, and increased resilience to climate change and other stressors.

By the end of this presentation, attendees will have a better understanding of what machine learning is, its potential benefits for water resource management, and how they can start learning and applying these techniques to their own data.

Presenters

Connie Rodriguez

Operations Specialist - Research

Clean Water Services

Connie Rodrigues is an Engineer-in-Training and Operations Specialist at Clean Water Services. Connie holds a Civil Engineering degree and specialization in Environmental Engineering from Texas A&M University, as well as a graduate certificate in GIS from Portland State University. She has a diverse background that encompasses over 6 years of experience in civil and environmental engineering in plan review, transportation research, and most recently, focusing on machine learning modeling. At Clean Water Services, Connie has been instrumental in the development of the IoT network and bringing machine learning applications to the organization.

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Hillsboro, OR

Topic Track: Digital Tools/AI

Date: Wednesday - 9/13/23

Time: 8:30 - 9:00

A Novel Surrogate Process Control for Digital Microbial Source Tracking

High bacterial levels in ambient surface waters or stormwater can be a vexing problem to solve, as the traditional fecal indicators (typically E. coli or Enterococcus) give no indication of their source. Accordingly, many agencies have turned to PCR-based methods to determine the source of fecal pollution in various water matrices, a technique known as microbial source tracking (MST). The Sketa assay has been used in both research and regulatory contexts to quantify nucleic acid extraction recovery and/or environmental matrix inhibition in quantitative PCR water quality studies. The field of MST is moving to digital PCR, in which the variability from sample concentration and nucleic acid extraction exceeds the variability introduced from inhibition. Thus, a total workflow process control with an appropriate surrogate target is a more suitable approach to data quality assurance for digital PCR. Here we present a duplex Surrogate Process Control (SPC) assay for droplet digital PCR using a commercial spike-in whole-cell product at a cost of pennies per sample. This SPC measures the recovery of both gram-positive and gram-negative bacteria, which is important in contexts where both are measured for MST, e.g. Bacteroides and Enterococcus. This SPC was optimized, validated, then compared to the Sketa assay in seawater (n=5), freshwater (n=5), stormwater (n=5) and municipal wastewater influent (n=5) on the basis of percent recovery and percent inhibition. Sketa recovery (when added at the extraction step) ranged from 71- 139 percent for all samples. While inhibition was low (0% samples inhibited), the total SPC recovery varied greatly depending on environmental matrix. Average gram-positive percent recoveries were 22, 12, 9, and 1.6 for freshwater, marine beaches, stormwater, and wastewater, respectively. Average gram-negative percent recoveries were 11, 7, 4.4, and 0.4 for freshwater, marine beaches, stormwater, and wastewater, respectively. Measuring inhibition alone failed to identify samples that lost greater than one-log of material through sample concentration, especially in more challenging environmental matrices. Overall, this SPC is a robust and streamlined approach to quality control for digital PCR MST assays.

Presenters

Dr. Blythe Layton

Senior Research Program Manager

Clean Water Services

Blythe Layton is a Senior Research Program Manager at Clean Water Services, where she started the Molecular Biology laboratory (m.lab) in the Research & Innovation Department in 2020. Previously she was a Faculty Research Associate at Oregon State University, as well as a Microbiologist with the Southern California Coastal Water Research Project (SCCWRP) for 5 years. Blythe earned MS and PhD degrees in Environmental Engineering Science from Stanford University, where her thesis focused on microbial source tracking in the coastal environment. Research in the m.lab uses genomic technologies (including droplet digital PCR and Oxford Nanopore sequencing) to address challenges in biological

wastewater treatment, ambient and storm water quality, biodiversity assessment, and wastewater surveillance.

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Topic Track: Digital Tools/AI

Date: Wednesday - 9/13/23

Time: 9:00 - 9:30

Much Ado About Digital, But What's Right for Me and How do I Adopt It?

Much has been publicized in the industry about the potential for digital or "smart water" technologies to address modern challenges. Some impressive successes have been demonstrated by digital technology providers that are leveraging sensors, data systems and machine learning to optimize systems and backstop operator transitions. A digital roadmap to complement renewal, replacement and upgrade plans for physical infrastructure can help a utility access the value of digital tools, increasing resilience and allowing more to be done with fewer resources. To implement digital technologies, the water utility manager must navigate a myriad of different technology providers and products to evaluate, prioritize and select the right solutions, and then figure out how to implement, integrate, and manage through the associated changes necessary to realize the benefits of the new digital technology products.

This presentation will offer an overview of digital water technologies and their potential benefits, explain the scope and importance of a digital roadmap within the master planning context for utility infrastructure, and review methods for selecting and implementing technologies. Case studies will be reviewed including the following:

1. Deploying sensors in collection systems establishes historical data for use in planning activities while enabling conditions-based maintenance. Olathe, Kansas suffered from high I&I. They needed dependable sensors for data collection backed by software with analytical capabilities so they could assess their basins and determine where to achieve the highest impact in reducing I&I.

2. Leveraging sensors, data and machine learning can help manage collection systems and avoid overflows. Houston, Texas experienced frequent dry weather SSOs due the accumulation of FOG in random locations in their collection system. Sensors, a digital twin and machine learning were utilized to identify forming obstructions prior to overflows occurring so that crews could be dispatched to clear the obstructions.

3. Implementing a digital twin for a WRRF can improve communications between stakeholders and optimize sub-systems for less consumption of energy and chemicals. The utility needed to unify their team around data-driven decision making and capture institutional expertise ahead of expected retirements. A digital dashboard of the 70 MGD CAS WRRF was implemented for these purposes.

Presenters

Steve Green

Digital Water Practice Leader

Stanley Consultants

Steve Green leads the Digital Water Practice at Stanley Consultants, helping water utilities adopt new software, sensor and data technologies that improve efficiencies and mitigate risks. Steve has spent his

23 year career in business development and project delivery roles in the water industry, helping water system owners improve their infrastructure via technology adoption and collaborative project delivery. Steve holds a Bachelor of Science degree in Bio-Resources Engineering from Montana State University and a Masters of Business Administration from the University of Washington.

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Portland, Oregon

Topic Track: Digital Tools/AI

Date: Wednesday - 9/13/23

Time: 9:30 - 10:00

Mining for Lead: Tackling LCRR Unknowns with Collaborative Intelligence

The Environmental Protection Agency (EPA) released the Lead and Copper Rule Revisions (LCRR) to better protect children and communities from the risks associated with exposure to lead in drinking water. While lead was banned in 1986, the EPA estimates 6 to 10 million lead service lines are in use across the U.S, representing about 7 percent of all households. The LCRR require an inventory of all utility-owned and customer-owned lead service lines to be submitted by October 16, 2024. Many utilities lack a comprehensive inventory of the service lines, including the material. While this data typically exists, it is often not collated in a digital system that is searchable and mapped to an individual address.

This presentation will explain the digital strategies with a focus on machine learning and predictive modeling to inventory services lines and tackle the unknowns. The audience will leave with knowledge of innovative ways to conduct materials inventories and achieve LCRR compliance by the compliance date.

Presenters

Steven Drangsholt

Lead Solutions Representative

Trinnex

Steven works for Trinnex, a digital solutions firm focused on solving water's greatest challenges with elegant solutions and increasing digital literacy. As an experienced project manager and engineer in both consulting and public agencies, Steven has led large programs throughout the PNW. With his more than 17 years in the industry, he has served on the PNCWA Board and as WEF's Speaker of the House.

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Boise, ID

Shervin Khazaeli, PhD

Senior Data Scientist

Trinnex

Shervin is a data analytics developer with a PhD in Artificial Intelligence (AI) focusing on probabilistic decision-making. He is experienced in developing autonomous frameworks for data analysis and decision-making using advanced AI algorithms. His experience encompasses different aspects of AI

projects from project planning and data collection to operational deployment. Shervin is the lead data scientist for leadCAST Predict. His experience includes exploratory data analysis, model training and testing, and model deployment.

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Vancouver, British Columbia

Topic Track: Utility & Asset Management

Date: Wednesday - 9/13/23

Time: 10:30 - 11:00

The Boise Business Case Evaluation (BCE): Aligning Levels of Service with Capital Project Decision Making Criteria

The City of Boise's (City) water renewal utility, Water Renewal Services (WRS), has used a Business Case Evaluation (BCE) tool to inform capital project alternative evaluation and selection across their facilities since 2016. Following significant updates to their Level of Service (LOS) goals and Capital Project Delivery Model (PDM) through their Utility Plan development and implementation, they recognized the need to update their BCE tool's criteria and processes to align with these new organizational values and processes.

In June 2022, the City engaged Brown and Caldwell (BC) to update their BCE tool to better align their organization-wide goals and commitments. The team improved user experience and drive tool adoption by refining usability and standardization. As a result, the new BCE:

- Aligned BCE tool assumptions, risks, and benefits with LOS
- Translated LOS goals into risk monetization criteria for inclusion into the tool
- Updated existing monetization assumptions and improve data source transparency
- Improved ease of use and overall BCE tool accessibility
- Increased the efficiency and defensibility of the decision-making process

This presentation will discuss the approach and results of the BCE tool update, outline how to translate high-level LOS goal language into quantifiable and monetizable evaluation criteria, and highlight opportunities for scaled application across other organizations.

The presentation will also provide the opportunity for other utilities and municipalities to consider how a BCE may help translate organizational values into decision-making criteria to support consistent application of LOS or other priorities throughout projects related to climate goals, utility resilience, employee experience, and more.

Presenters

Manon Fisher

Rockies Utility Strategy and Performance Practice Leader

Brown and Caldwell

Manon has over ten years of experience in the water sector, focusing on driving an industry shift from water treatment toward resource recovery to address risk and build more resilient communities. Manon's expertise lies in bridging holistic planning efforts to outcomes-oriented implementation and

project delivery and identifying opportunities to center community needs in utility management. Her focus areas include facilitating the development of levels of service, strategic communications, strategic planning, policy development, capital planning, asset management and resource recovery program development. Manon brings a unique set of business strategy and utility management expertise to complex problems driving triple bottom line improvements.

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Denver, CO

Evan Carpenter

Topic Track: Utility & Asset Management

Date: Wednesday - 9/13/23

Time: 11:00 - 11:30

From Independence to Integration: Building the West Point Capital Program

Known as the Emerald City, Seattle is famous for picturesque views, coffee culture and rain. Located on the shore of the Puget Sound in Discovery Park, the West Point Treatment Plant (WPTP) is the largest wastewater treatment plant in the Pacific Northwest, providing treatment for up to 440 million gallons per day of combined storm and sanitary flows. Operated by King County's Wastewater Treatment Division (WTD), it is relied upon daily to protect the environment and the public health of approximately 750,000 residents and businesses in Seattle and northern King County.

Constructed in 1966 and expanded to secondary treatment in the early 1990's, the WPTP needs significant investment over the next 10 years to improve resiliency and replace aging asset needs. As the workhorse of WTD's treatment facilities, any construction that could affect the plant's ability to provide peak treatment capacity is limited to each year's "dry-season" between April and September. Also, the facility is on a 32-acre site with land, water, height and depth constraints limiting available space for construction activities.

In June of 2020, WTD started to develop the West Point Capital Program (WPCP) with the vision to deliver projects at the WPTP in a coordinated manner, improving schedule performance, fostering better relationships between operations and project delivery staff, elevating project delivery procedures and reducing risks.

Implementing a programmatic delivery approach for the WPTP helps WTD to manage dependencies between projects, provide consistent and integrated tools and documents to all project teams in real time. The program also improved communication across project teams, and enabled a broader management approach to identify, anticipate and manage schedule impacts and overall risks. This presentation will describe some key tools and processes that have served the WPCP well and contributed to the results obtained to date. It will also identify the challenges and lessons learned that the team faced while setting up the program and running the initial 2 years of the WPCP and where the program will go from here.

Presenters

Felix Brandli

WPCP Program Manager

King County Wastewater Treatment Division (WTD)

Felix is a program manager with King County's Wastewater Treatment Division (WTD) and has over 10 years of project and program management experience in Europe and the US. Felix has a Master's Degree in Environmental Engineering from the Swiss Federal Institute of Technology and is a certified Project Management Professional (PMP). Felix has led various infrastructure improvement projects in the

wastewater and energy efficiency sectors. Most recently, Felix is currently serving as the program manager of the West Point Capital Program (WPCP) responsible for delivering over $800M of critical infrastructure improvements at King County's West Point Treatment Plant.

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Seattle, WA

Nicole Ream

Vice President

Stantec

Nicole is a program manager and vice president with Stantec and has 24 years of experience in leadership, facilitation and business development. She has deep knowledge of programs gained through direct experience with large water infrastructure projects with a total capital value of $3.8 billion. Nicole works with teams to understand complex challenges, develop actionable plans to find resolution, and reach consensus. She has a unique skillset for working with large teams to assess existing processes, define needs and drivers for change then facilitating team to develop effective strategies and processes for organizational change. Nicole is currently serving as part of the program leadership team on the King County West Point Capital Program (WPCP) and the City of Boise's Lander Street and West Boise Improvement Programs (LSIP and WBIP).

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Denver, CO

Topic Track: Utility Planning & Management

Date: Wednesday - 9/13/23

Time: 11:30 - 12:00

Road Trip! Taking Integrated Planning for Municipal Wastewater and Stormwater on the Road

Current Clean Water Act regulations affecting municipal wastewater and stormwater discharges inhibit collective efforts as individual stakeholders are forced to address rigid and narrowly focused regulations. EPA's Integrated Municipal Stormwater and Wastewater Planning Approach Framework that applies systems thinking based on a one water principle, coupled with local accountability. A more effective one-water regulatory framework can create more economical and sustainable outcomes that result in better overall water quality. Integrated planning is a concept that supports prioritization of capital investments in all forms of water infrastructure designed to protect human health and the environment, and to incorporate societal objectives in the most cost-effective, affordable way. Integrated planning also provides more coordination and up-front planning at the local level along with local stakeholder accountability. The result is less cost to achieve ultimate goals, compliance with regulations, and successful outcomes. While the framework has existed for a decade and is now part of the Clean Water Act, less than 0.5 percent of communities are taking advantage of it.

The Water Environment Federation established the Integrated Planning Task Force (IPTF) to provide effective and focused leadership about integrated planning through collaboration with WEF committees, WEF members, regulators, municipalities, and other stakeholders. A long-term goal for the IPTF is to increase incorporation of integrated planning in the development of municipal National Pollutant Discharge Elimination System (NPDES) permits and consent decrees in enforcement actions under the Clean Water Act.

The Roadmap for Integrated Planning purpose is educating this audience about integrated planning and helping utilities and regulators understand how integrated planning could benefit the utility, the regulatory agency, the community, and the environment. This session will provide an overview of the content of the Roadmap and the plans to help both utilities and regulators become more knowledgeable about integrated planning and to begin using it for NPDES permitting and enforcement actions. Participants will learn about when integrated planning is likely to be most successful, reinforced with case study experience, and how an integrated plan can be efficiently developed for a community.

The paper will summarize the IPTF's plans for taking the roadmap "on the road."

Presenters

John Phillips

Director of Integrated Watershed Management

Parametrix

I have been working in the water industry since 1999 and I am the Director of Integrated Watershed Management. I have experience in emergency planning, comprehensive planning, long range planning,

climate change science, climate adaptation, wet weather issues, green infrastructure, and co-benefit analysis. I have an extensive background in climate adaptation, equity and social justice and applying climate science to pro-active actions. I have spent many hours working with the University of Washington Climate Impacts Group scoping specific studies to better understand how science impacts urban planning and utility planning. My work has been featured in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report and the 2014 National Climate Assessment. In addition to climate adaptation, I am recognized as a national leader in the use of green infrastructure for addressing combined sewer overflows (CSO) and integrating green infrastructure into long-term CSO control plans.

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Seattle

Topic Track: Utility Planning & Management

Date: Wednesday - 9/13/23

Time: 12:00 - 12:30

WEF's WISE Utililty Management Program - An Update

There's never been a better time than now for utility leaders to examine and improve business processes throughout their organization. With many utilities experiencing on-going staffing and funding challenges, the Water Environment Federations' (WEF) WISE program for Utility Management provides utility leaders with a framework and methodology to create greater value and improve performance. This comprehensive approach to improve management and performance in water sector utilities encourages full systems thinking. It provides greater value to stakeholders, improves senior leadership's ability to make an impact, and increases employee engagement and thus their motivation to add value to the organization. It is a collaborative peer-to-peer effort that includes leading utilities from all over the U.S. including Charlotte Water, Louisville MSD, Great Lakes Water Authority, San Francisco, DC Water, the City of Portland and others in the US as well as utilities in Canada and the United Kingdom.

One of the greatest strengths of the WISE program is the collaboration among the participating utilities: the Utility Partners. Subject Matter Experts from the Utility Partners have created leading practice models for Capital Improvement Programs, Asset Management, Capital Project Business Case Evaluation, and several other business processes. The presentation will include an overview of the methodology and several case studies where utilities have successfully employed elements of the approach as well as the findings of current pilot projects. Participants will learn how they can become part of the consortium of utilities improving their business practices in meaningful and comprehensive ways.

Presenters

Mark Poling

Senior Consultant

Clean Water Management

Mark is an independent consultant and sole proprietor of Clean Water Management, a consulting firm focusing on utility management. He is a member of the Water Environment Federation WISE Utility Management program team focused on helping utilities provide increased value through business process improvement. He has nearly 40 years of experience at Clean Water Utilities including utility management, water resource recovery facility operation, maintenance, design, and construction.

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Grand Rapids, MI

Topic Track: Solids Processing

Date: Wednesday - 9/13/23

Time: 8:00 - 8:30

Saving Millions through Operator-Friendly Thickening and Solids Dewatering Solutions at the Columbia Boulevard WWTP

Increased dewatered cake solids will save approximately $1 million per year in biosolids hauling costs at the Columbia Boulevard Wastewater Treatment Plant (CBWTP). By 2045, CBWTP will thicken up to 724,000 pounds and dewater 260,000 pounds every day. The existing solids handling facility was built in 1970 on a foundation of wood piles, and the aging equipment was in need of replacement. The project presented an opportunity to upgrade primary sludge thickening in addition to WAS thickening to improve digestion performance.

Alternatives to rehabilitate the existing solids processing building were evaluated and due to desire for increased seismic resiliency and operation during construction, the decision was made to build a new solids treatment facility. There are site constraints at the CBWTP, ideally the new solids facility would be located near the existing facility, which is boxed in on multiple sides with existing infrastructure. This led to design of a unique multi-story triangular shaped solids handling facility, with a bridge across an existing channel and additional supports on the other side to allow trucks to pass underneath.

The co-thickening system design includes eight 3-meter-wide gravity belt thickeners, blend tanks, feed pumps, thickened sludge storage tanks and pumps, polymer facilities, and cameras for monitoring. The dewatering system design includes five 29-inch-diameter dewatering centrifuges, feed pumps, polymer facilities and conveyors to hoppers and the loadout facility. Operations and maintenance (O&M) staff were engaged at all stages of design to provide input on access and O&M needs. This led to multiple monorails, bridge cranes, and an elevator to allow for access to all of the equipment that is located on various floors of the new facility. The new biosolids storage and loadout facility provides redundancy and allows automated biosolids hauling 24-hours per day through monitoring/instruments including hoppers equipped with ultrasonic level sensors and weigh cells as well as full-length truck scales in each of the two loadout bays.

The presentation will walk through the decision process for this new state of the art solids handling facility, operations and maintenance considerations, and a live model fly-through of the unique multi-story solids facility.

Presenters

Jamie Dooley

Wastewater Engineer

Jacobs

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Portland, Oregon

Brett Reistad

Wastewater Engineer

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Corvallis, Oregon

Topic Track: Solids Processing

Date: Wednesday - 9/13/23

Time: 8:30 - 9:00

Getting It To Fit – New screw press allows City to increase capacity without expanding

Located between the cliff and a river, the City of Lewiston's wastewater treatment plant had little room for expansion. The City's dewatering system was undersized and required frequent maintenance. The City had a contract with a composting company to provide biosolids within an acceptable solids range. To compound the problems, the belt filter press was located on the second floor of a very small room in the center of the plant. The City was looking for an ideal solution that could fit into the existing space, reduce maintenance for the plant operators, and meet both the capacity and performance requirements.

As part of a performance-based evaluation process, the City selected HUBER Technologies, Inc.'s Q-PRESS 800.2 units. The new screw presses were among the first to include the high-capacity auger system, which consists of two design advances from previous models. The first design advancement being an elongated filtration zone in the inlet area which allows for a relative improvement in free water drainage. The second advancement is a more aggressive auger flight pitch which provides the unit with a higher solid conveyance capacity. These advances allowed the screw presses to dewater sludge 20% faster, reducing the required footprint and time of operation. This presentation will highlight the plant constraints, selection process, and also demonstrate the enhanced performance provided by the new screw presses.

Presenters

Holly C. Johnson, P.E.

Senior Project Engineer

Keller Associates

Holly has over 30 years of wastewater engineering experience in the Midwest and Pacific Northwest. She has been responsible for all phases of project development, from master planning through design and construction. Holly has extensive experience with dewatering, including as the senior project engineer for the dewatering improvements at Lewiston, Idaho. She has a master's degree and a bachelor's degree in civil engineering from the University of Nebraska – Lincoln.

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Meridian, ID

Christian T. Primm

Group Project Manager - Mechanical Biosolids

Huber Technology, Inc.

Christian Primm is the Group Product Manager for Mechanical Biosolids Products at HUBER Technology, Inc. where he specializes in solids screening, thickening, and dewatering processes. Christian is a member of the Water Environment Federation (WEF) and is an active member of the Solids Separation Subcommittee. His professional studies include analysis of upstream process effects on sludge thickening and dewatering, and meta-analysis of performance data sets to predict future solids handling system performance.

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Denver, NC

Topic Track: Inflow & Infiltration

Date: Wednesday - 9/13/23

Time: 9:00 - 9:30

No flow meter? No problem - Quantifying Benefits and Return on Investment for I&I Repairs

Erratic climate patterns coupled with aging sewer infrastructure has caused many utilities to worry about their wet weather management strategies. One of the major contributors to wet weather flows is Infiltration and Inflow (I/I) which is a function of pipe material, pipe age, groundwater level and precipitation. In some cases, when groundwater level is above the invert elevation of the sewer collection pipes, I/I can also result in increased dry weather flows. With many utilities across the country planning major infrastructure sewer network upgrades due to ageing infrastructure, areas with highest I/I are usually a low hanging fruit to minimize wet weather flows. However, quantifying the benefits of such sewer upgrades is often difficult due to limited flow measurements typically available across sewersheds where upgrades are performed. The lack of flow measurements coupled with climate variability year over year render the use of simple 'before' and 'after' comparisons ineffectual. To avoid the bias and uncertainty due to climate variability, a different methodology is required to compare data and quantify impacts. This study investigates an alternate methodology of using pump station energy consumption data in lieu of flow measurements for quantifying the benefits for approximately $20 million in investments made by a utility1 for rehabilitation of 210,000 linear feet of sewer pipe across six (6) sewersheds. This paper will review the approach of using a "control sewershed" i.e. a sewershed not having undergone any repairs, with similar characteristics as that of the sewershed undergoing rehab, to eliminate bias and using this alternate approach to quantify reduction in flows as a result of the I/I repairs. This paper will also review the approach for quantifying the return on investment for the rehabilitation as well as cost savings as a result of deferred treatment capacity expansions for the receiving wastewater treatment facility.

Presenters

Nandita Ahuja

Senior Principal Engineer

Hazen and Sawyer

Nandita Ahuja has over 9 years of experience in the water and wastewater engineering industry. Her experience includes hydraulic and process modeling, master planning and infrastructure design. She is passionate about leveraging data analytics to inform better engineering decisions in our industry.

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Cincinnati, OH

Topic Track: Inflow & Infiltration

Date: Wednesday - 9/13/23

Time: 9:30 - 10:00

Deep Dive Into Deep Infiltration

This presentation will dive into a case study from Gresham, OR where deep infiltration was used to reduce the strain on an overwhelmed MS4 system. This site had shallow perched groundwater but beneath the silt layers were permeable sands and gravels that were perfect for infiltration. By drilling deeper, the stormwater can infiltrate and reduce the burden on the existing MS4 system.

This deep infiltration system was also installed in an existing residential street, which had tight existing utilities. By minimizing the footprint of construction and surgically targeting the location of the drywell, the construction timeline is shortened, and the risk of damaging existing infrastructure is reduced.

These deep infiltration systems are designed to protect groundwater quality by having a minimum of five feet of vertical separation between the bottom of the drywell and the high seasonal groundwater level. Results from monitoring this deep infiltration system will also be shared.

Presenters

Stormwater Consultant

Oldcastle Infrastructure

Kathryn holds a B.A. in Chemical Engineering from Oregon State University and has worked in both the stormwater manufacturing industry and private civil consulting. She has over 15 years of experience in stormwater treatment design including rainwater harvesting, infiltration, detention, and regional stormwater management. Having worked on projects in Oregon, Washington, and California, she loves to talk all things stormwater.

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PORTLAND, OR

Topic Track: Water Policy

Date: Wednesday - 9/13/23

Time: 10:30 - 11:00

The National Water Policy Fly-in: Two days of Policy and Sore Feet in DC

Water professionals from across the country descended upon the nation's capital for Water Week 2023 (April 23-29) for a full slate of in-person events and meetings, including on Capitol Hill, which is now fully reopened to the public.

This year's Water Week provided professionals with the opportunity to directly learn more from key federal officials about the implementation of the historical policy achievements secured by the water sector over the past two years, and significant actions on EPA's regulatory agenda that will directly impact the water sector. It also provides the opportunity to build on this momentum and come together on Capitol Hill to advocate to Members of Congress the importance of ensuring all communities continue to have access to safe, reliable, and affordable drinking water and clean water.

PNCWA member visited Washington DC in-person furthering key water policy priorities such as sustained growth in federal infrastructure investment, addressing water affordability, supporting water research & development and advancing sound science-based solutions, and making our critical infrastructure more resilient.

Each states delegates will speak to who they met with, what they learned and how that impacts the Pacific Northwest. As your representative, the Government Affairs Committee member in attendance will provide vital information on federal legislative action and how you elected congress is approaching legislation and how we can better advocate for important water policy. We will talk about the individual meetings with legislatures and their staff, share information form keynote speakers like Radhika Fox, with the US EPA and how Washington DC is grappling with issues that impact us like PFAS, climate change and infrastructure funding and affordability.

Presenters

Susan Schlangen

Engineer

WSC

Susan has more than 10 years of engineering experience in the industrial and civil sectors. Located in the Portland office, she is engaged in infrastructure design, asset management, and system planning as well as strategic planning. Susan received a B.S. in Civil Engineering from the University of Minnesota in 2011 and a M.Eng in Environmental Engineering from Portland State University in 2018.

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Portland, OR

John Beacham

Public Works Director

City of Post Falls

I have worked on both technical and labor intensive projects in my career within the public works sector. As an engineer, I am always looking for ways to improve systems; as a member of operations staff, I enjoy finding the best way to get things done and move on to the next task at hand; as a manager, I seek to provide staff with the tools and training needed for success and to provide the most positive work environment possible.

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Post Falls, ID

John Phillips

Director of Integrated Watershed Management

Parametrix

I have been working in the water industry since 1999 and I am the Director of Integrated Watershed Management. I have experience in emergency planning, comprehensive planning, long range planning, climate change science, climate adaptation, wet weather is

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Seattle, WA

Topic Track: Water Policy

Date: Wednesday - 9/13/23

Time: 11:00 - 11:30

Make Your Voice Heard at the State Level: Navigating the Legislative Cycle to Promote Better Water Policy

Good water policy is informed by experience and expertise of the practitioners who work with resulting rules and regulations every day. Setting a course towards good policy frameworks and enforceable requirements begins with connecting those policymakers with their constituents. Learn to effectively advocate to state legislators regarding bills which affect your entity or area of expertise.

State codes governs a significant portion of what utilities are allowed to do, cannot do, and must do. In the northwest, these laws are written by part-time legislatures comprised of representatives from all areas of the state and all walks of life. Knowing how to effectively engage can make a big difference in educating state lawmakers, who are responsible for important water policy but often do not understand how it impacts utility operations.

Advocacy begins far before the legislative session, at the local level and continues year-round. Once the legislative session is underway, many bills are already far along in the drafting process with substantial support of various groups and voting blocs. Attempting to get a new idea off the ground or to redirect a flawed bill once it gains momentum are both challenging tasks. Clean water industry professionals provide a vital service by supporting members in navigating this process. A few of the activities we can pursue more effectively as an organization include:

Anticipating emerging legislation and understanding potential impacts.

Educating lawmakers to enhance their ability to create quality legislation.

Supporting lawmakers in advancing legislation that supports and protects clean water goals.

Presenters will share advice on how to engage local legislators outside the legislative session, how to engage during the session itself, tools for monitoring the legislative process, and provide considerations to be taken when commenting on behalf of a public or private agency. The presentation will include both theoretical guidance and real-world examples from Government Affairs Committee members.

Presenters

John Beacham

Public Works Director

City of Post Falls

John Beacham currently serves the City of Post Falls as its Public Works Director. He’s enjoyed past opportunities working as a wastewater operator for the City of Portland, a consultant, and as a manager for a multinational contract operations firm. John grew up in a small town in northeast Washington and

earned a civil engineering degree from the University of Idaho. John currently serves on the board for PNCWA and previously chaired both the Young Professionals and Government Affairs committees.

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Post Falls, ID

Susan Schlangen

Senior Engineer

Water Systems Consulting

Susan has more than 10 years of engineering experience in the industrial and civil sectors. Located in Portland, OR, she is engaged in infrastructure design, asset management, and system planning as well as strategic planning. Susan received a B.S. in Civil Engineering from the University of Minnesota in 2011 and a M.Eng in Environmental Engineering from Portland State University in 2018.

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Portland, OR

Topic Track: Startup & Commissioning

Date: Wednesday - 9/13/23

Time: 11:30 - 12:00

Trying to Start the Fire – Lessons Learned in the Startup of Three 16 Million BTU Firetube Steam Boilers

Abstract Summary:

The purpose of this presentation is to share the issues, corrective actions, and lessons learned during the startup and commissioning of steam boilers that feed three thermal hydrolysis process (THP), designed to process 375,750 dry lbs/day.

Background:

The Achilles heel of the Thermal Hydrolysis Process (THP) system are the ancillary support systems (potable water, compressed air, steam etc.). The THP system cannot be tested, commissioned or started-up without steam. The boiler system and associated infrastructure is as crucial for facility operation and reliability as the THP system. Consequently, any delay in the testing can result in a day-for-day loss to the project schedule.

With an increase of THP systems across the country, the demand for industrial sized steam boilers at Wastewater Treatment facilities has also increased. The addition of large boilers can pose new and frustrating challenges that are unique to the boiler industry, and uncommonly encountered in municipal facilities. This presentation will delve into the challenges that arose during the commissioning and startup of three 16 million BTU Firetube steam boilers. Specifically, gas supply challenges, gas regulating valve placements, excess head loss and steam supply issues for injection into the Deaerator.

This boiler system case study consists of three boilers, a deaerator, three feed water pumps, a chemical dosing system, and a water softener system. Serving as the installing Contractor and the Commissioning Manager, MWH led the startup and testing of the boilers, troubleshooting and coordination between project stakeholders. Due to the criticality of boiler system reliable operation, MWH was responsible for collaborating with stakeholders to develop work arounds and final infrastructure corrections.

This presentation will outline the issues that arose, the troubleshooting steps taken to determine the route causes, steps used to ensure the boilers were ready to support the startup of the THP systems, and finally, review crucial lessons learned throughout the process.

Presenters

Emmett Minner

Senior Startup and Commissioning Engineer

MWH Constructors

With over four years of experience ranging from both design to in field engineering, Emmett is currently a Senior Startup and Commissioning Engineer with MWH Constructors. Emmett has a Mechanical Engineering background that allows him to focus on the mechanical aspects of project startup.

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Dallas, Texas

Topic Track: Startup & Commissioning

Date: Wednesday - 9/13/23

Time: 12:00 - 12:30

Electrical Commissioning: It's all good until it doesn't turn on

Over the past 10 years I've had the unique opportunity to both write electrical and I&C testing specifications as a design engineer and execute those testing specifications in the field working as a C&SU manager on multiple water/wastewater projects.

It's often we find the specifications to be lengthy and most owner's and general contractors don't understand the effort required to execute the testing in the specification, nor do they even know what the testing entails. Owner's and general contractors become extremely reliant on their EI&C subcontractors to tell them when and how to execute the work. This typically isn't a problem until the project team is up against the deadline to start-up the plant or the individual piece of equipment, and their subcontractor is holding them hostage. I often get asked, what testing really must be done to start a piece of equipment? How much time should be allocated in a schedule to account for this testing? How should all the testing predecessors be tracked allowing for a green light for the commissioning phase? In what order should the testing be conducted? All these questions have led me to spend the last several years of my career, looking at how to optimize this process and how best to communicate the requirements with owners and contractors who may not speak the EI&C language.

This presentation will cover testing requirements/types at a high level, then I'll take a deeper dive into the order in which testing should be executed and where there might be opportunities to expedite testing in the schedule.

Presenters

Lindsey Rafter

C&SU Manager

MWH Constructors

Commissioning and Startup (C&SU) Manager focusing on system integration, instrumentation, and electrical aspects of commissioning. Ten years of experience working on a multi-disciplinary design team in a water/wastewater design group and as a commissioning manager. As an instrumentation/electrical design engineer, was responsible for all aspects of the instrumentation and electrical designs for various processes within water/wastewater treatment plants. As a commissioning manager, is responsible for management of overall C&SU scope, with a focus on coordinating with integration teams and EI&C subcontractors.

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Boise ID

Topic Track: Chemical Treatment

Date: Wednesday - 9/13/23

Time: 8:00 - 8:30

Advanced Dose Control: iCT-based Optimization of Disinfection Chemistries

WRFs using chemical disinfection with traditional means of control (e.g. flow pacing), typically overdose disinfectant by a factor of two. This overdosing can result in issues of excessive disinfectant cost, excessive quenching cost, disinfection byproduct formation, inconsistent performance, and inadequate public health protection. Advanced Dose Control (ADC) is a model-based disinfection control technology that seeks to account for the variables that impact disinfection performance (hydraulics, chemical background demand, and disinfection kinetics) and, regardless of process variability, to normalize disinfection outcomes while optimizing chemical dosages to avoid both over-dosing and under-dosing. This approach is particularly advantageous in times of chemical supply shortages and force majeure conditions, where WRFs may be challenged with potential chemical run-out events. This presentation will highlight the foundations of the technology and present plant-scale pilot data demonstrating its performance vis-a-vis flow-pacing with both bleach and peracetic acid, and furthermore, will illustrate the implications of ADC's use at facilities using chemical disinfection, including significant cost savings (40%-50%), improved reliability, reduced discharge of residual disinfectant, byproducts, and ultimately, reduced risk of permit violation.

Presenters

Ian Watson

Technology Development Manager

USP technologies

Ian Watson is a chemical engineer with 20 years' experience in wastewater treatment. In his role as a Technology Development Manager at USP Technologies he not only designs, implements, and supports USP's chemical treatment programs for municipalities across North America, but also works to develop new products to the wastewater marketplace. Ian is an active member of organizing committees of several conference including WEF Odor & Air Pollutants conference and California Water Environment Association (CWEA) Annual Conference and is the current Vice President of CWEA's Engineering and Research Committee, and a member of CWEA's Southern Sewer Collection System Committee.

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Paso Robles, CA

Topic Track: Chemical Treatment

Date: Wednesday - 9/13/23

Time: 8:30 - 9:00

Can Rocks Replace Chemicals? Lake Stevens Sewer District Selection of Liquid Calcium Carbonate as New Non-Hazardous pH and Alkalinity Control Chemical

Lake Stevens Sewer District (LSSD) and Columbia River Carbonates have worked closely since early 2022 to pilot improved RAS alkalinity and pH control at their Sunnyside WWTP operating in Lake Stevens, WA. This facility uses state-of-the-art membrane technology, designed to meet or exceed Washington State Department of Ecology permitted limits for contaminants in discharged effluent.

In January 2022, the two began replacement of 25% sodium hydroxide with MICRONATM AquaCal 70, a 70% solids micronized calcium carbonate aqueous slurry for alkalinity and pH control of mixed liquor at the 5 MGD MBR Sunnyside WWTP. While operating this pilot, wastewater quality and membrane permeability have been closely monitored while maintaining all standard operating conditions.

Results from the MICRONATM AquaCal 70 pilot for mixed liquor alkalinity and pH control and have been noted to a) decrease variability of alkalinity and pH in MBR mixed liquor, b) produce consistent pH control, allowing better conversion of ammonia to nitrates/nitrites and reduction to final effluent with a significant decrease in MBR mixed liquor alkali requirement, c) increased Suez membrane permeability and better operating conditions, d) decreased plant energy consumption, e) decreased overall alkalinity reagent chemical spend. These will be fully documented and presented.

LSSD also completed a 9-month pilot replacement trial of 25% sodium hydroxide added to MBR mixed liquor using 60% magnesium hydroxide from April through December 2021 and found improvement in some but not all operating and effluent quality parameters discussed above with respect to MICRONATM AquaCal 70.

Based on the 2021-2022 evaluations of magnesium hydroxide and calcium carbonate, LSSD is moving forward with converting from usage of 25% caustic soda to the continued use of 70% calcium carbonate aqueous slurry because of its cost-effective, non-hazardous and easy to handle qualities as a wastewater mixed liquor alkalinity and pH control product. Additionally, the selection of calcium carbonate aqueous slurry at the Jacobs run Spokane County Regional Water Reclamation Facility and Sunriver Utilities Co. build confidence in the use of CaCO3 for required alkalinity and pH control during secondary stage aerobic biological treatment by LSSD.

Presenters

Jeremy Weisser

Industrial Sales Manager

Columbia River Carbonates

Jeremy Weisser graduated from Central Washington University with a degree in Chemistry and Biology.

He began his career with Columbia River Carbonates in 2007 focusing on research and development and technical services. Through this role he was able to focus on product development and trial/project management.

In 2016, Jeremy transitioned to a fulltime sales role with a focus on industrial customers. In the last several years, Jeremy has primarily focused on both waste water and drinking water applications, using calcium carbonate as an alkalinity and pH control reagent.

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Woodland WA

Topic Track: Optimization for Nutrient Removal

Date: Wednesday - 9/13/23

Time: 9:00 - 9:30

Water Research Foundation's Web-Based Tool to Expedite Nutrient Optimization at WRRFs

Clean water agencies, regulatory agencies, and watershed stakeholders are searching for innovative approaches and best practices to address water quality challenges due to nutrient enrichment and a changing climate. A key component of such improvements is to take advantage of existing assets through optimization. While potentially attractive, optimization is a daunting task and a comprehensive guide on implementing optimization has been lacking.

This presentation is part of the Water Research Foundation project 4973 “Guidelines for Optimizing Nutrient Removal Plant Performance” that developed a comprehensive guide on implementing an optimization strategy for water resource recovery facilities (WRRFs) with an emphasis on nutrient management (based on full-scale examples). The presentation focuses on a key component of the guide, the nutrient optimization decision trees that can assist WRRFs with navigating nutrient optimization.

The nutrient decision trees developed will be available on the Water Research Foundation’s website this calendar year as part of a web-based tool. The decision trees ask the user a series of questions, whereby the responses inform the generation of a list of potentially viable optimization strategies for their WRRF. Each potentially viable strategy has a corresponding Fact Sheet associated with it to further assist the user as to whether such a strategy might work for their WRRF.

While more extensive detailed analyses will likely be required to verify/validate each potential strategy for facility specific applications, the decision trees expedite the optimization effort and help initiate the process. For example, the decision tools have been applied to satisfy the optimization planning requirements of the Puget Sound Nutrient General Permit (PSNGP). The decision trees benefit wastewater utilities by providing a comprehensive screening of optimization opportunities that efficiently narrow considerations to the most promising options. In this way, resources can be focused on the facility specific details of optimization.

As part of the presentation, the Water Research Foundation web-based tool will be used in real-time to highlight the ease of using the tool. The audience should leave the presentation with an understanding on how to use the decision tree tool.

Presenters

Mike Falk, PhD, PE

Sr Professional Associate

HDR

Mike joined HDR in 2008 after completing his graduate studies at UC Davis. This presentation is based on a recent Water Research Foundation project (#4973) that focused on WRRF optimization for nutrients.

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Sacramento, CA

Topic Track: Optimization for Nutrient Removal

Date: Wednesday - 9/13/23

Time: 9:30 - 10:00

Process Optimization of a 30 MGD MBR WRF to Meet Strict Phosphorus Requirements

The City of North Las Vegas Water Reclamation Facility (CNLV WRF) uses a traditional Johannesburg process and a membrane biological reactor (MBR) aimed at removing phosphorus and nitrogen. During a recent capital improvement project to re-coat the MBR basins, the CNLV consolidated the number of basins in-service from 12 to 9 MBR trains. The basin consolidation impacted the stability of the biological phosphorus removal performance.

A study was conducted to identify and evaluate potential optimization opportunities to improve the stability of the biological phosphorus removal process. The study targeted key process parameters, such as chemical addition, solids retention time, hydraulic retention time, and oxidation reduction potential, all of which can also impact MBR performance. Seven optimization scenarios were developed focusing on three themes: peak flow management, solids loading in the MBR (chemical and biological), and dissolved oxygen concentration in the MBR and recycle streams.

All optimization opportunities were evaluated using a wastewater process modeling software with the intent of shortlisting several optimization alternatives to test on the full-scale process. The simulation results were used to estimate process performance, such as MBR permeate phosphorus, ammonia, and nitrate concentrations, under varying operational conditions.

This presentation will highlight the impact of peak flow management with the use of an equalization basin and the importance of balancing solids loading by optimizing chemical addition and dissolved oxygen concentration in the return streams by optimizing recycle rates.

Presenters

Katerina Messologitis

Process Engineer

Stantec

Katerina Messologitis, PE (OR, ID) is a water/wastewater process engineer at Stantec and has approximately 6 years of planning, piloting, and design experience. Katerina often uses process modelling software to support clients in evaluating treatment performance, process capacity, and process optimization opportunities.

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Portland, OR

Topic Track: Wastewater Treatment

Date: Wednesday - 9/13/23

Time: 8:00 - 9:00

Large-Scale Intensified Secondary Treatment at the Sand Island WWTP

The Sand Island WWTP is the largest treatment plant in Hawaii, serving Honolulu and surrounding areas and treating an average flow of 65 MGD. The facility currently provides preliminary treatment, chemically enhanced primary treatment, and UV disinfection prior to discharge through a 2.4-mile outfall. The WWTP is located on a highly constrained site adjacent to public recreation facilities, industrial facilities, and the primary access road from the island of Oahu to Sand Island located in Honolulu Harbor.

The City and County of Honolulu entered into a Consent Decree to upgrade the Sand Island facility to secondary treatment standards, and recently began construction of a 20 million gallon per day (MGD) membrane bioreactor (MBR) facility as Phase 1 of the secondary expansion. Phase 2 of expansion will provide the additional 90 MGD of secondary treatment capacity required to meet full secondary standards and support future growth. Phase 2 will also add peak flow equalization, upgrade preliminary and primary treatment, and expand solids treatment processes to treat the additional waste activated solids generated by the new secondary process.

Previous planning evaluated a wide range of secondary treatment technologies for the Phase 2 expansion, however since the site was not intended to support full secondary treatment, only intensified processes including MBR, biological aerated filters (BAF), and aerobic granular sludge (AGS) are able to provide the full secondary treatment capacity required within the footprint available. The 90-MGD Phase 2 expansion would represent one of the largest facilities in North America using any of these technologies, therefore the City conducted extensive investigation including detailed process evaluation and site visits to nine large facilities in the United States and Europe. A large group of City stakeholders evaluated the secondary process alternatives based on qualitative and quantitative criteria, relying on technical information from the design team and operational experience and performance shared by utility peers during site visits.

This presentation will describe the evaluation conducted to assess the large-scale intensified treatment processes considered for the Phase 2 expansion, review the City's selected process, and describe how the technology is being implemented.

Presenters

Heather Stephens

Regional Wastewater Practice Leader

Stantec

Heather Stephens' professional career has focused on providing consulting to municipal agencies facing complex challenges around wastewater treatment and resource recovery. Her experience spans all

aspects of wastewater engineering including system planning, facility planning, pipeline rehabilitation and design, wastewater treatment plant expansion and rehabilitation, resource recovery planning, and program development and implementation. Heather has a bachelor's degree from Harvey Mudd College and master's degree from the University of Washington. She currently serves as a Regional Wastewater Practice Lead for Stantec Consulting, working on projects in Hawaii and the Pacific Northwest.

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Portland, OR

Topic Track: Wastewater Treatment

Date: Wednesday - 9/13/23

Time: 9:00 - 9:30

How Much Does Grit Cost You?

A major barrier to quantifying the true cost of grit is these costs are typically accepted as routine maintenance assigned to different parts of the plant so the root cause may not be identified by the common denominator. If grit is not managed by removal in the headworks, it will continue to downstream processes and must be managed throughout the plant. Grit deposits in downstream process tanks, taking up space, reducing retention time and increasing velocity which impacts treatment efficiency. Grit deposition in the aeration basin can increase energy requirements needed to achieve proper treatment. Accumulation in digesters can create unstable operating conditions by reducing volatile solids destruction, impairing mixing, and reducing gas production. To remove deposited grit basins must cleaned. Digester cleaning is expensive, dangerous and time-consuming, requiring taking the basin offline, exposure to dangerous gasses, confined space entry, repairs and recommissioning, not to mention removing, handling and disposing of the deposited material. Grit is also responsible for abrasive wear to virtually all mechanical equipment it contacts.

All plants are interested in improving efficiency, reducing O&M costs, improving plant performance, and reducing energy requirements or moving towards energy neutrality. If plant staff could quantify the cost of bypassing grit process improvements could be justified.

The purpose of this paper is to provide tools to understand effective design points for grit removal systems and assess the true cost of grit while shedding light on why the grit removal process is important.

Presenters

Eric Tobin

Regional Sales Manager

Hydro International

Eric Tobin is Regional Sales Manager for Hydro International – Water & Wastewater Division which specializes in the development, design and fabrication of unique, high performance systems for removal of grit, sugar sand, abrasives and fixed solids. Mr. Tobin has worked in various roles in the municipal and industrial wastewater markets for over 15 years. Mr. Tobin has a Master's degree in Business Administration from University of Strathclyde in Glasgow, Scotland and a Bachelor of Science degree in Mechanical Engineering Technology from Weber State University in Ogden, UT.

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Topic Track: Pollutant Modeling

Date: Wednesday - 9/13/23

Time: 10:30 - 11:30

On-Demand Risk Assessment of Pollutant Spills in Open Water Bodies

Lake Ontario is the primary source of drinking water for approximately half the population of Ontario, with the majority of that population residing in the Greater Toronto Area (GTA). In 2013, Source Water Protection studies identified sensitive areas near the drinking water intakes where the risk of impacts from accidental spills is considered a credible threat to human health and safety. A spill causing an acute contamination event at one of the water supply intakes could have catastrophic impacts to the population. However, the ability of stakeholders to assess the potential impacts and develop an appropriate response is presently limited to static planning level studies and maps. These proved to be useful tools for identifying the potential locations where pollutants may show up, but they did not provide any indication of the potential risks due to the conditions in the lake at the time of the spill.

In 2019, the Ontario Clean Water Agency together with the City of Toronto, Region of Peel and Region of Durham hired DHI to develop the Lake Ontario Water Quality Forecasting System (LOWQFS). The LOWQFS assists in evaluating the likelihood of a pollution event originating from any discharge source within, and adjacent to, Lake Ontario being transported to any one of the water treatment plant intakes located along the Greater Toronto Area (GTA) waterfront. The system collects climate forecasts and uses it to update a 3D hydrodynamic model of Lake Ontario to predict the water level, currents and temperature throughout the lake. The system also includes a Spill Forecasting tool for on-demand creation of spill events that are run using the latest hydrodynamic forecast. The results are made available for plotting of spill concentrations on a map and in time-series plots, and impacted water intakes are identified and reported to relevant stakeholders.

The system is currently in operation and emergency response plans are being updated to integrate the use of the LOWQFS into the protocols and workflows.

Presenters

Patrick Delaney

Vice President, Water Supply and Urban Drainage, Americas

DHI Water and Environment, Inc.

Patrick is Vice-President of Water Supply and Urban Drainage for DHI in the Americas. He is a professional engineer with over 25 years in the development and application of water modelling tools and operational system technologies to help communities achieve their sustainable development objectives. He has managed many complex, inter-disciplinary water management projects involving emergency spill forecasting in freshwater lakes and rivers, flood forecasting in urban and riverine environments, and coastal storm surge forecasting.

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Topic Track: Pollutant Modeling

Date: Wednesday - 9/13/23

Time: 11:30 - 12:30

Exploring Environmental DNA: Piloting a Novel Method for Monitoring Biological Characteristics of Surface Waters in the Tualatin River Watershed

Environmental DNA (eDNA) refers to DNA shed by organisms into the environment, and can be captured in water, soil or air samples. By identifying DNA captured in a sample, we can infer species present within a given environment. As such, eDNA is a promising tool for understanding spatial and temporal variation in biodiversity across a watershed. Clean Water Services (CWS) is a water resource and recovery district serving Washington County, Oregon. CWS discharges to the Tualatin River, a meandering, valley-floor river, sensitive to nutrient inputs and stream flow augmentation. Accordingly, our watershed-based NPDES permit directs CWS to monitor the biological characteristics of 15 sites within the watershed each permit cycle. This work is typically completed using macroinvertebrate surveys, which are costly and limited in biological scope, and therefore provide limited information. Given eDNA's promise as a means for characterizing broader biodiversity between sites, we are piloting eDNA as a novel method for gaining detailed biological information, that could potentially be used in the future in-place of traditional macroinvertebrate surveys. The first phase of a multistep project has been to monitor nine sites representing diverse habitats within the Tualatin River Watershed, on a monthly or quarterly basis through a metabarcoding eDNA approach using water and sediment samples. This presentation will discuss the observed differences in biodiversity between sites over the course of a year, and whether eDNA metabarcoding data can be used to assess temporal shifts in species-use at a particular site or habitat area. Additionally, we will demonstrate how aquatic algae identification via eDNA compares to morphological identification via microscopy, and suggest how this comparison may inform future studies. Finally, we will discuss how we plan to use these data to develop a framework for regularly monitoring biological characteristics to demonstrate the effectiveness of our watershed enhancement actions and in fulfillment of our NPDES permit.

Presenters

Hannah Ferguson

Op Specialist - Research

Clean Water Services

Hannah Ferguson holds a BS in Biology from Pacific Lutheran University and an MS in Biology from Ball State University. Joining Clean Water Services in April 2021, Hannah's work involves designing sampling campaigns that use environmental DNA to answer regulatory and ecological questions, tracking viral and microbial pathogens through influent, surface and reuse waters, and on-boarding new molecular assays.

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Topic Track: Wastewater Treatment

Date: Wednesday - 9/13/23

Time: 9:30 - 10:00

How High Velocity, Headloss, Flushable Wipes, Plastics and Grinders Affect the SCR Capture Performance of Headworks & Membrane Protection Screening Systems

Water and Wastewater Membranes need to be protected against fibrous & sharp debris. This not only protects all downstream systems & monitoring equipment, including water & wastewater membranes from premature surface abrasion & clogging, but site studies have shown that 1.0 mm & 0.5 mm aperture membrane pre-screening significantly reduces the annual number of membrane desludging/cleaning cycles by up to 3-fold. It also reduces the labor intensity of each cleaning cycle while eliminating clogging of aeration manifolds that scour membrane surfaces. Fine Pre-screening has become extremely important in protecting both membrane warrantees and lifespans. Laboratory & field experiments prove the vast majority of debris is caused by chopping & maceration equipment installed at pump stations or inside plants to protect downstream equipment from disposable wipes & plastics flushed into our sewer systems. The presentation will emphasize the importance of fine screening with data showing how short, fine cotton-wool-polyester fibers, human hair, as well as filamentous algae will pass through 6.0 mm, 3.0 mm and 2.0 mm aperture screens and “Recombine” downstream into larger rag type debris that increases the operating maintenance & cleaning cycles of all downstream systems and monitoring equipment. The Presentation will also include supporting pilot plant & field data that focuses on why velocity & headloss are the two most important operational characteristics in understanding how screens are properly sized, maintained & operated. Computational Fluid Dynamics Analysis (CFD) with (SCR) Screening Capture Ratio data will reveal the direct relationship velocity & headloss have on a screen’s capture efficiency & performance. It will also emphasize the aperture requirement for removing 2 dimensional versus 3 dimensional solids. A screen’s effluent quality affects the lifespan, operation & maintenance of all downstream systems & monitoring equipment. Headworks and membrane protection screens share the same velocity and headloss limitations that affect their performance and debris capture. Both lab and site test data will demonstrate and support the shared conclusions of this presentation. Whether the drivers are regulatory, reuse or to improve downstream process efficiencies, the trend has been to remove non-biodegradable debris, algae & aquatic remains from influent flow.

Presenters

James Impero

Senior Engineering Specialist

Ovivo USA, LLC

As Sr. Engineering Specialist, I, James Impero have been performing laboratory and site-specific research studies for Ovivo for the past 21 years, as well as providing engineering improvements to screening equipment and wastewater systems engineered and marketed. I have been authoring papers for

publication and presenting abstracts at various regional water/wastewater conferences since 2004, as well as training Product Managers & their supporting engineering staff.

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Salt Lake City, UT

Topic Track: Stormwater

Date: Wednesday - 9/13/23

Time: 10:30 - 11:30

Retrofitting Informal Right-of-Way through Collaborative Natural Drainage System

To address regulatory commitments, Seattle Public Utilities (SPU) launched the Natural Drainage Systems (NDS) Partnering program in 2017 by developing retrofits in the three major creek watersheds within the City. Due to topography, historical development, and economic factors, much of this area lacks formal drainage infrastructure.

Working with sister agencies, concurrent SPU programs, and community partners, the purpose of the NDS Partnering program is to deliver high-value improvements to over 60 blocks of neighborhood streets in Seattle's urban creek watersheds. The purpose of the partnering in the NDS program is to develop shared projects within SPU programs and between SPU and other City agencies to offer multiple benefits to neighborhoods and the natural environment, including greener neighborhoods, reduced flooding risk, improved natural habitat for native plants and animals, healthier creek ecosystems, and calmer traffic patterns. This presentation will highlight the program goals and site selection process and share lessons learned in addressing the challenges and opportunities of partnering to retrofit underdeveloped urban right-of-way.

The current NDS program consisting of the Longfellow Basin (under construction), South Thornton Basin (construction starting summer 2023), and North Thornton and Pipers Basins (under development and design). This program leverages innovations developed under recently constructed retrofit projects to enhance the viability of green infrastructure in challenging site constraints and soils. These innovations include the use of weirs, underdrains, structural soil cells, and underground injection control wells.

The program's innovative green infrastructure improvements are an example of how to successfully balance the needs of the right-of-way while improving quality of stormwater runoff. SPU strives for continual program improvement through delivery community-centered projects that economically improve service.

Presenters

Dustin Atchison

Global Principal for Stormwater and Watershed Management

Jacobs

Dustin is the contract manager for the Natural Drainage Systems Partnering Program. He also serves as Jacobs' Global Principal for Stormwater and Watershed Management and has over 26 years of experience in stormwater management. He is recognized regional and national leader in low-impact development (LID) and green infrastructure with expertise in development of master plans, guidelines, education and implementation of stormwater solutions that bring multiple benefits to communities. He

has an extensive resume in stream restoration, wetland restoration, and culvert replacement projects on Puget Sound lowland streams.

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Seattle, WA

Juan Romero

Water Resources Engineer

Jacobs

Juan is the project engineer and basin lead for the South Thornton Natural Drainage Systems Partnering project. In this role he oversaw all aspects of the project design and was involved in coordination with other city agencies and the community outreach effort. He is a water resources engineer with Jacobs' Buildings, Infrastructure, and Advanced Facilities group in Bellevue, Washington with over 11 years of civil engineering experience including serving as project engineer for other stormwater and green infrastructure projects in Western Washington.

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Topic Track: Stormwater

Date: Wednesday - 9/13/23

Time: 11:30 - 12:30

Addressing Drainage Issues Through Root Cause Analysis

Oftentimes long term localized drainage issues require a root cause, basin-wide analysis to identify the truest source of the issues. Leaving no rock unturned leads to developing sustainable solutions. Issues from frequent roadway flooding, localized ponded water, high groundwater, poor water quality, and lack of conveyance systems can all be addressed through taking a big picture look at the existing systems and focusing on aligning solutions with current and future community needs and funding sources. A comprehensive plan can then be developed, breaking down the basin approach into bite-sized solutions that can be implemented over time.

Josh and Ronnie will discuss how they work with the full suite of stakeholders to get to resolution on sticky long-term drainage issues. They will examine four case studies to understand key lessons learned associated with creatively addressing multiple issues in route to developing an actionable basin plan. The resulting action plans are focused on optimizing and retrofitting existing regional facilities and existing conveyance systems to manage stormwater from current and future developments, in order to drive and maintain economic growth and meet environmental requirements. Aiming to steer conversations with the community through the implementation of innovate stormwater concepts, these case studies offer valuable methods for problem solving on a larger scale.

The root cause analysis performed by the team includes in-depth data reviews, field walks with O&M staff, review of maintenance records, on-site conversations with impacted community members, collection of detailed field information (geotechnical and flow monitoring data) and ultimately performing detailed hydraulic modeling to identify drainage areas of concern. All feasible alternatives to improve water quality and reduce flows to surface water by increasing stormwater infiltration, retention, and detention are considered and analyzed in terms of cost-effectiveness. Alternatives that are developed include a variety of projects from new storm drain systems, groundwater collection drains, hydraulic connections for disconnected areas, and new/retrofitted regional facilities. We will discuss our teams approaches to engaging with the community to assist in developing practical and creative solutions that minimize disruption to citizens lives, reduce the risk of flooding on private property, and provide sustainable solutions.

Presenters

Josh Van Wie

PE & Practice Lead

Osborn Consulting, Inc.

Josh is Osborn Consulting's Eastern Washington Practice Lead and managed all the case studies examined in this presentation. Josh has worked on a variety of surface water management projects throughout Washington State and understands how to meet localized Ecology requirements. His

experience includes surface water basin studies, planning, and design for flood reduction, water quality improvements, drainage conveyance, fish passage culverts, and stream restoration. He has performed extensive hydrologic and hydraulic modeling work, including model development and calibration, and is knowledgeable about a variety of modeling software. His focus on projects is developing holistic sustainable solutions that align both community and city expectations.

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Spokane, WA

Ronnie Piechowski

EIT & Project Engineer

Osborn Consulting, Inc.

Ronnie has experience in planning and design report writing, data collection, alternatives analysis, research and compliance, retrofitting existing systems, conveyance and BMP design, meeting Ecology requirements, and H&H modeling. Utilizing H&H models, Ronnie examines the functionality of existing systems to identify the root cause of drainage issues. She enjoys developing sustainable solutions that address multiple community benefits. Ronnie has an in-depth understanding Eastern Washington drywell standards, including the UIC rules and Ecology requirements. Her experience includes developing a system wide comprehensive inventory for local cities and working closely with city and maintenance staff to prioritize improvements to address flooding concerns.

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Spokane, WA

Topic Track: Utiliy Management and Funding

Date: Wednesday - 9/13/23

Time: 8:00 - 9:00

Make it Rain (Stormwater Funding)

In 2022, the City of Spokane Valley was operating its stormwater utility with the lowest monthly stormwater rates for residents in Washington State. Osborn Consulting partnered with the City to develop a proposed stormwater rate structure that encourages the City to proactively operate the utility. A key to success was utilizing an engineering-led team of experts in stormwater management, coupled with FCS Group's knowledge of rate development. The resulting success was when City Council voted to raise stormwater fees for the first time in close to 15 years.

Stormwater comprehensive planning – maybe you do it every year, maybe the dust is starting to collect on your latest plan. Either way, planning for adequate funding and practical stormwater capital improvement projects (CIPs) can often make you feel like you're drowning (pun intended). This presentation will throw out the life preserver and share how the City of Spokane Valley achieved this incredible investment in their stormwater utility program and how other agencies have approached CIP planning.

The City has experienced significant population increase in recent years and is subject to increasing regulatory requirements for stormwater. Having not increased their stormwater utility fee in close to 15 years, the City hired Osborn Consulting to lead a consultant team in developing a proposed fee increase and a stormwater utility program master plan. Our goal was to establish a plan for the City to efficiently manage the capital improvement programs, operation and maintenance, retrofits, and level of service for the stormwater utility.

The presentation will cover key concepts utilized by the team in developing the City's Stormwater Utility Program Master Plan and other stormwater plans. This includes 1) how to approach identifying and planning for implementation of new Ecology requirements, 2) strategizing CIP development and long-term phasing, and 3) identifying programmatic needs. Finally, we will review the team's approach to aligning all the "new initiatives" over the long term to develop a sustainable rate structure for the community with a focus on balancing growth and environmental stewardship.

Presenters

Tarelle Osborn, PE

Principal & President

Osborn Consulting

As President and Principal Engineer of Osborn Consulting, Tarelle Osborn has been leading stormwater system analyses and designs in the Pacific Northwest for more than two decades. Her experience spans a wide variety of projects, including hydraulic and hydrologic analysis required for outfall design, stormwater mitigation, stormwater conveyance, drainage design, detention systems, water quality

treatment, and erosion control design. Recently, Tarelle managed the development of a stormwater program master plan, rate study, and proposed rate revision plan for the City of Spokane Valley. The plan addresses new and increased requirements of the MS4 Permit and UIC Rule Guidance. Tarelle worked with the City to review existing stormwater asset inventory and assess drainage areas of concern to prioritize and estimate stormwater capital improvement projects as part of the plan. Once the projects were identified, OCI developed the master plan and supported the City in approving a proactive stormwater rate increase.

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Bellevue, WA

Ann Bryant, PE

Senior Project Manager

Osborn Consulting

Ann Bryant has 18 years of water resources planning and design experience. She has provided design work, detailed analysis, computer modeling, and technical documentation for systems throughout Western Washington. Ann has developed Capital Improvement Projects (CIPs) through multiple basin planning efforts with cities throughout Western Washington. In addition, she has delivered surface water planning work and has supported local agencies in developing new stormwater programs, which allows her to stay up to date on successful planning strategies throughout the Puget Sound Region. Ann is currently leading the CIP development for the City of Mukilteo's 2024 Stormwater Comprehensive Plan. The Plan will define appropriate levels of service for the stormwater program, update capital projects and stormwater program activities that support goals and regulatory requirements, and evaluate financial alternatives for achieving program goals.

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Bellevue, WA

Bella Burzynski, EIT

Project Engineer

Osborn Consulting

Bella Burzynski is an experienced EIT who has worked on projects for public agencies that involve pipe condition assessments, stormwater planning, green stormwater infrastructure design, water quality treatment design, and utility analysis and design thro

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Topic Track: Utiliy Management and Funding

Date: Wednesday - 9/13/23

Time: 9:00- 10:00

Strategies for Effectively Communicating Utility Rate Increases

Utilities throughout the United States are facing unprecedented challenges including aging infrastructure, water supply insecurity, prolonged drought, uncertainty, water quality improvements, and more stringent environmental regulations. Customer rate increases are needed to protect our vital infrastructure and build a resilient water future for our communities. While conversations regarding rate increases are rarely convenient, they are necessary to build political and community support.

How do we communicate the complex drivers for rate increases? How do we facilitate conversations in which customers feel heard and respected? These questions are top of mind for local leaders and decision-makers as they explore creative and adaptable solutions.

As a uniquely integrated engineering and communication firm, WSC has extensive experience working collaboratively with clients to build understanding around vital infrastructure investments amongst their rate payers and building community trust.

We will share strategies and best practices for effective rates outreach and engagement, including the following:

- Considering community values and priorities when making infrastructure investments and structuring rates
- Leading a transparent and thoughtful process that results in defensible decision-making
- Leveraging data and storytelling to showcase investment needs
- Proactively engaging key stakeholders including high-users, influential community members, fixed-income customers, and more
- Centering tactics in empathy and understanding
- Directly addressing tough questions and key concerns
- Communicating the risk of deferred maintenance and community benefit

Attendees will walk away with the following skills and tools:

1. A framework for building community trust and support for rate adjustments
2. Lessons learned from recent rate increase work in the Portland area
3. Tools and resources to consider in developing your “rates outreach toolset”
4. An appreciation for two-way engagement with stakeholders and customers

These tools can support districts and agencies of all sizes in creating effective communication and engagement strategies for needed utility rate increases.

Presenters

Jennifer Rogers

Strategic Communications Lead, Pacific Northwest

WSC

Jennifer Rogers serves as the regional lead for WSC's strategic communications practice in Portland, OR. She has over 15 years of experience in the communications space focused on drinking water and wastewater utilities, source water protection, recycled water, water storage, and flood management projects. She is inspired by the influence effective communications has in building trust in communities. She currently lives in Portland, Oregon.

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Portland

Topic Track: Wastewater Process Resiliency

Date: Wednesday - 9/13/23

Time: 10:30 - 11:30

Process Resiliency and Response through Cross-Basin Activated Sludge Seeding

Clean Water Services (CWS) is a wastewater, stormwater, and watershed management utility serving the populous of Washington County, Oregon USA through implementation of a watershed based NPDES permit. CWS operates 4 water resource recovery facilities (WRRF) with biological nutrient removal (BNR) activated sludge configurations to achieve phosphorus and ammonia nitrogen removal to low levels.

The Rock Creek WRRF is comprised of East and West trains configured in an anaerobic-anoxic-aerobic (A2O) process. On the East side there are 4 activated sludge basins (AB 4-7) that exist as pairs of identical basins. AB 4 and 5 are single pass basins tending towards complete mix reactors. AB 6 and 7 are three-pass plug-flow style basins with three swing zones for denitrification. All basins receive an independently controlled dose of volatile fatty acids (VFA) from primary sludge fermentation to effect enhanced biological phosphorus removal (Bio-P). Differences exist between AB 4-5, and AB 6-7 in the ability to step feed primary effluent to different zones within the basin. The basins are operated as discrete units with independent and isolated biomass in each basin.

Nitrification and Bio-P are sensitive processes prone to upset conditions, particularly during the colder months. To increase the resiliency and reliability of the basins to perform this biology, CWS has installed a Cross-Basin Activated Sludge Seeding system (C-BASS). This system is capable of diverting a portion of the return activated sludge (RAS) from one basin to another. The plant is required to nitrify year-round to varying levels depending on receiving stream flow, so one basin is kept in a fully nitrifying condition. C-BASS is used to rapidly establish nitrification in other basins as permit limits change. The facility faces VFA limitations even with primary sludge fermentation. One or two basins may be heavily dosed with VFA for robust Bio-P, and C-BASS used to get the benefit of residual phosphorus uptake in the other basins. Waste activated sludge (WAS) remains an independent system and can be managed to retain biomass during C-BASS.

C-BASS is a simple and effective system that many facilities could install in-house to improve resiliency and expand process control options.

Presenters

Erik Lorntson

Operations Analyst

Clean Water Services

Erik Lorntson is an Operations Analyst at Rock Creek Advanced Wastewater Facility in Hillsboro, OR. He started with CWS in 2010 as a Plant Operator at Rock Creek and moved into the Operations Analyst role in 2019. He has a BS in Public History from North Dakota State University and an AAS in Environmental Technology from Linn-Benton Community College. He is an Oregon Grade IV certified operator.

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Hillsboro, OR

Chris Maher

Senior Operations Analyst

Clean Water Services

Chris Maher is a Senior Operations Analyst in the Technology Development and Research Department at Clean Water Services in Washington County, Oregon. He has a BS in Chemistry from Colorado State University and began his career in operations at the Upper Blue Sanitation District in Breckenridge, CO where he earned his MS degree in Environmental Engineering through the Illinois Institute of Technology with the assistance of the Water Environment Research Foundation. He is an Oregon Grade IV certified operator.

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Topic Track: Wastewater Process Resiliency

Date: Wednesday - 9/13/23

Time: 11:30 - 12:30

Case Studies in Resiliency with Aerobic Granular Sludge

Aerobic Granular Sludge (AGS) technology operates on an optimized batch cycle structure that creates the proper conditions to develop and maintain granules: large, dense microbial aggregates displaying as particles greater than 200 microns in diameter that perform biological nutrient removal and display exemplary settleability relative to conventional activated sludge (CAS). The layered microbial community of these granules enables simultaneous nitrification/denitrification and enhanced biological phosphorus removal to occur within the granular biomass. This technology therefore eliminates the need for clarifiers, carrier media, and return sludge pumping stations, as well as selectors or separate compartments for plants looking to achieve BNR. The enhanced settling properties allow the system to operate at a high MLSS in excess of 8 g/L without a loss in aeration efficiency due to the granular nature of the sludge. The AGS process can therefore provide a significant reduction in footprint requirements and energy demand compared to a conventional technology.

The AGS process has been implemented successfully for nearly years with over 100 plants either in operation or under construction globally. Introduced to the North American market in 2017, there are now over 10 plants operating or under construction in the United States. This session will present case studies of plants that selected the technology to prepare sites for future regulatory demands, population increases, and climate resiliency.

Presenters

Vedansh Gupta

Project Application Engineer

Aqua-Aerobic Systems, Inc.

Vedansh is a Project Application Engineer at Aqua-Aerobic Systems. He has completed his B.Tech. degree in Chemical Engineering from Malaviya National Institute of Technology, Jaipur, India and M.S. in Civil & Environmental Engineering from University of Utah, Salt Lake City, UT. He has experience in water or wastewater since 2018.

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Topic Track: Collaborative Delivery

Date: Wednesday - 9/13/23

Time: 8:00 - 9:00

Using Progressive Design-Build to Achieve Cost Certainty and Manage Risk for a New, Large-Diameter Outfall

Clackamas County's Water Environment Services (WES) has embarked on a project to build one of the largest new outfalls in the Northwest. Once constructed, this project will provide enhanced dilution performance to meet river water quality standards, protect beneficial uses in the Willamette River, and convert the existing outfall for use during peak wet weather events.

Designed to meet projected 2080 buildout flows of 168 mgd combined hydraulic capacity, the project benefited from early contractor input to successfully address challenging design criteria; rigorous permitting requirements; construction risk; and careful sequence of schedule constraints to work concurrently in the water with a nearby bridge widening project led by others.

The new mile-long 90-inch outfall construction requires installation of a 109-inch-diameter tunnel for half of its length in challenging ground conditions with a wet recovery in the Willamette River to install the 18-port 150-ft long diffuser at channel depth. For the remainder of the alignment, the outfall pipeline will be installed in a tight corridor between an old landfill and two of WES's major 72-inch-diameter pipeline assets that require uninterrupted use during construction.

This presentation will give an overview of how the team successfully navigates construction risks and increasing costs in a volatile market while maintaining the ability to provide design input by using the Progressive Design-Build (PDB) delivery approach. WES also hired an Owner's Agent to assist in the design/cost review, risk management, and permitting. The PDB contract started in 2022 after careful selection of a qualified Design-Builder, allowing WES to validate the project path forward while refining the construction approach to meet permit requirements and achieve greater cost certainty. The PDB approach has also allowed WES to collaborate more effectively with major stakeholders along the corridor (ODOT, City of Oregon City, multiple regulators) regarding project impacts and opportunities. Finally, WES has been able to gain increased cost certainty with estimates prepared by the Design-Builder that account for well-defined construction risk and contingencies and design opportunities.

Presenters

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Brownsville, WI

Topic Track: Collaborative Delivery

Date: Wednesday - 9/13/23

Time: 9:00 - 10:00

How Owner Involvement In Progressive Design Build Led To Success On A $580M Wastewater Conveyance Rehab Program In The San Francisco Bay Area

More public agencies are considering collaborative delivery to deliver major capital projects for water and wastewater facilities. In 2017, Silicon Valley Clean Water (SVCW), in Redwood City, CA, chose Progressive Design Build (PDB) to deliver all three of the projects making up the $580M SVCW Regional Environmental Sewer Conveyance Upgrade (RESCU) raw wastewater conveyance rehabilitation program. RESCU has stayed on schedule through the pandemic, and is in the commissioning phase concurrently on all three projects, with final completion anticipated by mid-2024. This presentation highlights the importance of Owner involvement in the entire PDB delivery process, from contractor team procurement, through design and construction, to start up and commissioning. Why PDB was selected, how PDB has been implemented over 6 years, and current status will be presented.

RESCU consists of three projects that cover the entire conveyance system:

- Front-of-Plant: new 75-foot deep 80MGD lift station, new headworks with screens and degritting, new 1000LF 63-inch HDPE transmission pipeline to the plant influent;
- Gravity Pipeline: 3.5 miles of 16-ft diameter conveyance tunnel in low strength soils and high groundwater, under a regional airport taxiway and busy residential thoroughfare. Tunnel concrete segment ring excavation support has a finished diameter of 13-ft and is lined with 11-ft diameter fiber reinforced polymer (FRP) raw wastewater conveyance pipe;
- Pump Station Improvements: decommissioned two of four existing conveyance pump stations, rehabilitation of one existing pump station, and replacement of one pump station with a new combined screening facility and wet weather pumping facility.

SVCW leadership championed the early adoption of PDB for wastewater infrastructure, including the first large-diameter wastewater tunnel to be constructed in the US using PDB. RESCU started prior to the Covid pandemic, and, thanks to the effort of the Owner's program team working remotely using Microsoft Teams (Teams was used on the Program starting in 2017), and the contractors' focus on safety, no time was lost through 2 years of pandemic shutdowns. RESCU is on schedule and within budget expectations, demonstrating the value of Owner involvement in supporting collaborative delivery using PDB.

Presenters

Kim Hackett, PE

Authority Engineer

Silicon Valley Clean Water

Kim Hackett is the Authority Engineer for Silicon Valley Clean Water. She manages the Engineering, Laboratory, and Environmental Services divisions at SVCW. Since 2018, Kim has been responsible for the implementation of SVCW's Capital Improvements Program, which includes a complete rehabilitation of the wastewater treatment plant plus the $580 million Regional Environmental Sewer Conveyance Upgrade (RESCU) program. She has over twenty years of experience in planning, design, construction management and project management of wastewater and recycled water projects, both as an engineering consultant and working in the public sector. Kim has a BS in Civil Engineering from UCLA and an MS in Civil and Environmental Engineering from UC Berkeley. She recently received her Masters of Public Administration from San Francisco State University.

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Redwood City, CA

Mark Minkowski, PE

Vice President

Kennedy/Jenks Consultants

Mark Minkowski is a Vice President with Kennedy/Jenks consultants with over 30 years in the industry, focusing on projects related to wastewater treatment, pipeline rehabilitation, and recycled water treatment and distribution. Mark leads Kennedy Jenks' national Pipelines Community of Practice and has served as the Program Manager for the SVCW $580M RESCU Program since 2017. Mark has a BS in Civil Engineering from University of Maryland College Park, and an MS in Water Resources from Stanford.

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Santa Clara, CA

Topic Track: Innovative Contaminant Removal

Date: Wednesday - 9/13/23

Time: 10:30 - 11:30

Turning Lemon Into Lemonade – The Sweet Success of Creative Application of Ammonia Removal to Control Microbially Induced Corrosion and Odor

A major interceptor with 7MGD flow in Pierce County's Chambers Creek Water Resource Recovery Facility (CCWRRF) collection system has historically been plagued by microbially induced corrosion (MIC) and odor problems, with gas phase hydrogen sulfide concentrations as high as 200ppm. The rate of concrete corrosion as measured by weight loss was 8-9 % annually based on a concrete coupon study.

The CCWRRF was expanded to provide biological nutrient removal in anticipation of nitrogen nutrient limit from the state, which in turn led to the requirement for industrial users to reduce nitrogen nutrient loadings. A wastewater characterization study revealed that an industrial user discharges a high-strength waste stream with an ammonia concentration as high as 2000 ppm and is a major contributor of ammonia loading to the interceptor. Armed with the knowledge that nitrate compound addition is one of the best solutions to control MIC, CCWRRF decided on a creative approach for nutrient removal by this industry. Instead of complete nitrogen nutrient removal through the full cycle of nitrification and denitrification, the industry is asked to nitrify only, generating a waste stream with nitrate concentration as high as 2000ppm which is discharged to the collection system. This strategy has been proven to be very successful and is mutually beneficial to CCWRRF and the industrial user: MIC and odor in this interceptor have largely been controlled, as evidenced by liquid phase sulfide concentration at less than 0.2ppm and gas phase hydrogen sulfide reduction by 90%, without incurring the significant cost of nitrate salt addition by CCWRRF; and the industrial user achieved significant costing savings by not having to add supplemental organic carbon to achieve denitrification.

Presenters

River Wan

Laboratory Supervisor

Pierce County

River graduated from University of Washington with an advanced degree in Chemistry. After a short stint in the private sector, he joined Pierce County as a chemist. Currently he is the laboratory supervisor responsible for the management of the laboratory and industrial pretreatment program.

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University Place

Topic Track: Innovative Contaminant Removal

Date: Wednesday - 9/13/23

Time: 11:30 - 12:30

Gaining Support For A New Bioavailable Aluminum Method To Implement The Aluminum Water Quality Standard

EPA promulgated aluminum aquatic life criteria in 2021 for Oregon based on the 2018 nationally recommended criteria. Aluminum is traditionally measured in environmental samples as total and dissolved aluminum, and criteria were based on total aluminum. However, the method to measure total aluminum uses a very low pH digestion which aggressively dissolves aluminum bound in clays and other mineral forms. This overestimates the amount of aluminum that is bioavailable and potentially toxic to aquatic life. Using total aluminum would assess more water bodies as impaired than would be accurate, and the listing could require TMDLs to be developed. For NPDES permittees using alum, this could result in unnecessarily restrictive aluminum limits which may impact the ability of WRRFs to use alum to meet phosphorus limits. Therefore, in implementation efforts, EPA recognized a new analytical method (Rodriguez et al. 2019) that measures bioavailable aluminum and allowed its use for river measurements.

Clean Water Services (CWS) is committed to studying analytical methods that best measure the potential toxicity of aluminum. The CWS Water Quality Lab began using the bioavailable aluminum method in 2019 and analyzed total, bioavailable, and dissolved aluminum in concurrent effluent and river samples from the Tualatin River. Results consistently show that a low fraction of the total aluminum is bioavailable to aquatic life in the Tualatin River, with an average of 7% bioavailable. Bioavailable aluminum concentrations were always less than the instantaneous water quality criteria calculated from the water quality standard, while 50% of total aluminum concentrations were greater than the criteria. Data also demonstrated that aluminum from CWS WRRFs that use alum is almost entirely bioavailable, highlighting the importance of reducing tertiary alum and the implementation of alternative methods of phosphorus removal. CWS has collaborated with Oregon DEQ to monitor total, dissolved and bioavailable aluminum in a broader range of rivers. CWS plans to continue bioavailable aluminum monitoring efforts and collaboration with Oregon DEQ in support of this method. ASTM publication, as well as 40 CFR approval, are important next steps in wider acceptance of the method by EPA in future aluminum criteria updates.

Presenters

Julia Crown

Water Resources Analyst

Clean Water Services

Julia Crown works for Clean Water Services in Washington County, Oregon, on wastewater regulations. She is an alumna of Portland Community College, Simmons University, and Oregon State University and holds degrees in biology and bioresource engineering. She previously worked for the City of Gresham in

the Industrial Pretreatment Program and at Oregon DEQ developing TMDLs and analyzing data for the Pesticide Stewardship Program.

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Hillsboro, OR

Emily Stefansson

Laboratory Specialist

Clean Water Services

Emily Stefansson works for Clean Water Services in their Water Quality Laboratory. She holds a B.S. in biology from Western Washington University and a M.S. in Environmental Chemistry from the University of Maryland. She previously worked as a researcher at Oregon State University studying topics ranging from metals toxicity in aquatic ecosystems to impacts of the Deepwater Horizon oil spill.

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Topic Track: Phosphorus Removal

Date: Wednesday - 9/13/23

Time: 9:00 - 10:00

Understanding Sidestream EBPR: Fermentation rate testing and PHA measurements

Conventional design and operation of enhanced biological phosphorus removal (EBPR) focuses on providing volatile fatty acids (VFAs) from the collection system and sometimes from primary sludge fermentation to phosphate accumulating organisms (PAOs) in an influent anaerobic zone. Alternately, sidestream EBPR (S2EBPR) diverts a portion of the RAS to a longer hydraulic retention time (HRT) sidestream reactor where biomass and particulate COD is fermented endogenously to generate the VFAs required. Successful S2EBPR operation hinges on the sidestream zone producing enough VFA to support healthy PAO populations in the HRT available.

Clean Water Services incorporated S2EBPR into a recent secondary expansion but did not observe the process to improve EBPR stability over conventional EBPR operation. In order to investigate possible reasons, the apparent fermentation rate (AFR) at three CWS facilities was measured. The results showed that there is variably in the AFR across time and season in the same facility, between different facilities and based on the method used. The CWS testing also highlighted an integral parameter used to estimate the AFR from batch testing results: the ratio of VFA removed to orthophosphate released (the P-release ratio). Long term measurements of the P-release ratio show that it is also highly variable over time.

Polyhydroxyalkanoate (PHA) measurements were also performed during the bench scale AFR testing and during full scale S2EBPR operation. The goal is to determine if shifts in carbon storage may impact S2EBPR process performance. The results indicate strong differences in the type of PHA stored between conventional EBPR and S2EBPR. The possible reasons for this shift will be explored but it is as yet uncertain how carbon storage changes relate to differences in process performance.

This presentation will provide an overview of how apparent fermentation rate testing fits into design and operational decision making and will discuss the overall methodology and approach. CWS results will be compared against original design assumptions and against wider industry results. The importance of the P-release ratio and possible sources of variability over time will also be summarized.

Presenters

Adrienne Menniti

Principal Process Engineer

Clean Water Services

Adrienne Menniti, PhD, PE is a Principal Process Engineer at Clean Water Services. Dr. Menniti has 15 years of experience in planning, design, optimization and troubleshooting of wastewater treatment processes.

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Topic Track: Biological Treatment

Date: Wednesday - 9/13/23

Time: 10:30 - 11:30

Metabolomics: An Innovative Tool For Characterizing And Troubleshooting BNR

Presenters

Erik R. Coats

Professor

University of Idaho

Dr. Erik R. Coats is a Professor of Environmental Engineering at the University of Idaho. He is also a licensed professional engineer in Oregon, Washington, and Idaho. Dr. Coats' research is focused on i) wastewater resource recovery, ii) developing an enhanced molecular-level understanding of biological nutrient removal processes, and iii) wastewater-based epidemiology (WBE). Dr. Coats' team applies molecular techniques to interrogate these microbial process. (https://www.webpages.uidaho.edu/ecoats/).

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Moscow

Topic Track: Biological Treatment

Date: Wednesday - 9/13/23

Time: 11:30 - 12:30

Growing Pains–How Pasco, WA is Getting Ahead of the Curve at Their WWTP

The City of Pasco has been one of the fastest-growing cities in the State of Washington and the nation for several years and keeping ahead of this growth has taxed the City's water and wastewater utility infrastructure and associated fund balances. The City is actively planning for future improvements at their wastewater treatment plant (WWTP) which have included, fast-track short-term capacity modifications, a comprehensive 20-year facility plan, the acquisition of State Revolving Fund (SRF) loan project funds, design of the first two phases of high priority improvements, and construction of the Phase 1 liquids-focused WWTP upgrade that will roughly double the capacity of the plant to just under 10 million gallons per day.

This presentation will focus on the planning, design, construction, and start-up of the WWTP's $22 million Phase 1 improvements which included the construction of an expanded and modified blower building with two new blowers and reuse of two existing blowers, two new aeration basins, the retrofit of two existing aeration basins, selector process considerations, aeration piping replacement, return activated sludge (RAS) piping modifications, mixed-liquor recycle (MLR) pump addition, over 1,100 LF of outfall piping upgrades, demolition of an existing trickling filter and associated appurtenances, and site work.

This presentation will:

- Provide a contextual overview of the existing facility and phased improvement planning
- Review unique Phase 1 design elements:
  - Use of an intentionally flexible anoxic/anaerobic selector to maximize rated capacity
  - Aeration basin FRP partitioning to convert from complete mix basin and create plug flow conditions to maximize capacity and aid foam removal
  - Blower selection and reuse of existing blowers
  - Probe selection, use, and location for operational control and data acquisition
  - Diffuser process selection for improved capacity and O&M access
  - Open Channel Mag Meter to maximize capacity
  - Preparation for future phases incorporated into the design
- Discussion of bid procedures for contractor responsibility and qualification-based bidding specific to Washington State requirements
- Discuss construction and facility start-up lessons learned

Presenters

Craig Anderson, PE

Principal Engineer

Consor

Craig is a principal engineer in Consor's Boise office. He has over 30 years of experience assisting municipalities with the planning, design, construction and financing of water and wastewater treatment facilities across the Pacific Northwest.

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Boise, ID

Mark Cummings, PE

Senior Engineer

Consor

Mark is a highly qualified professional with extensive experience in planning and designing wastewater improvement projects. With a strong background in facility planning and design, he possesses in-depth knowledge and expertise in addressing the wastewater treatment needs of diverse municipalities.

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Boise, ID

Will Kirby, PE

Civil Engineer

Consor

Will is an experienced water and wastewater field engineer, with wide-ranging expertise in utility and treatment projects, particularly in mechanical process design. In his free time, Will also designs virtual rockets.

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Boise, ID

Topic Track: Process Optimization

Date: Wednesday - 9/13/23

Time: 8:00 - 9:00

Using Dynamic Modeling to Design for Operations – Bridging the Design and Operations Gap

New and expanded facilities must respond to a full range of future conditions and operating scenarios to ensure system performance and regulatory compliance over their design life. Operators' perspectives are an essential part of the design process, especially to provide guidance on system controls. Jacobs engaged with the Bureau of Environmental Services' (BES) operations staff during early design of two new secondary clarifiers which resulted in more certainty with complex control schemes and the potential to reduce cost and risk during startup and commissioning. Presentation includes viewpoints from Jacobs, BES engineering, and BES operations staff.

The Secondary Treatment Expansion Program (STEP) includes the addition of two new circular 145-ft diameter secondary clarifiers at the Columbia Boulevard Wastewater Treatment Plant (CBWTP) that will be the largest clarifiers in the state of Oregon. CBWTP treats up to 450 million gallons per day with the combination of a wet weather treatment system and a secondary treatment system. STEP is increasing capacity through the secondary treatment system and changing the flow split between the two systems.

Early design workshops highlighted the complexity of the flow split scenarios (multiple flow streams and multiple control points) and effectively communicating how control decisions impacted hydraulic performance was challenging. Jacobs developed a design-level digital twin of the CBWTP secondary treatment system, so operations staff could engage with the flow parameters using the same visual interface and control logic as the constructed facility. The digital twin combined a detailed, dynamic hydraulic and simplified solids model, database structure, and instrumentation and controls narrative to simulate plant performance under a range of flow scenarios. Once the scenarios and control logic were developed, the design was stress-tested, using the tool, in an efficient and low risk environment. The operators' input during design refined control logic and narratives which will allow for more intuitive operation and smoother startup and commissioning to meet regulatory compliance goals.

Presenters

Kristen Jackson

Water Engineer

Jacobs

Kristen Jackson is a wastewater treatment process engineer and project manager with expertise in process mechanical design, hydraulics, startup and commissioning, and alternative delivery projects. She is personally passionate about energy conservation and she spent three years in the Peace Corps solving rural water and sanitation problems in Peru.

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Portland, Oregon

Stefan Chabane

Wastewater Operations Specialist

City of Portland Bureau of Environmental Services

Stefan Chabane is a Wastewater Operations Specialist at the City of Portland Columbia Boulevard Wastewater Treatment Plant (CBWTP). He is a grade 2 wastewater operator in Oregon, with previous certifications in California as a grade 2 in wastewater, distribution and water treatment.

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Portland, Oregon

Jeff Maag

Civil Engineer

City of Portland Bureau of Environmental Services

Jeff Maag is a civil engineer at the City of Portland Columbia Boulevard Wastewater Treatment Plant (CBWTP). He is the design lead on the liquids portion of the Secondary Treatment Expansion Project (STEP). He received a Bachelor of Science in Civil Engin

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Portland, Oregon

Topic Track: Process Optimization

Date: Wednesday - 9/13/23

Time: 9:00 - 10:00

Nitrogen Removal Optimization for King County's Wastewater Treatment Plants

The Puget Sound Nutrient General Permit (PSNGP) became effective on January 1, 2022 and requires larger dischargers implement optimization to maintain nitrogen discharge below action levels established by the permit. The Wastewater Treatment Division (WTD) of King County operates three large treatment facilities, South Plant, Brightwater, and West Point. As allowed by the PSNGP, WTD elected a bubbled action level for compliance flexibility, instead of individual action levels for each facility. This presentation discusses actions taken by WTD under its bubbled action level in 2022 to comply with the PSNGP.

This presentation will describe the optimization planning work that HDR Engineering, Inc. (HDR) conducted with WTD staff and discuss lessons learned from optimization strategy implementation. HDR used WRF 4973, Guidelines for Optimizing Nutrient Removal Plant Performance, as a guide for screening optimization strategies. HDR led a collaborative process with WTD staff to assess current influent and effluent nitrogen loadings, identify, model and screen potential optimization strategies, and engage staff in reviewing and selecting strategies.

Previous testing at South Plant indicated that the facility could be operated in Ludzack-Ettinger mode during dry weather conditions to accomplish partial nitrogen removal, and this was selected as the initial optimization strategy as it could be implemented immediately with limited to no capital improvement. At Brightwater, a construction project is underway which will allow the plant to operate at low dissolved oxygen levels and increase nitrogen removal while improving process stability.

The PSNGP requires continual planning and adaptive management to respond to optimization challenges and maintain discharges below action levels. Both South Plant and Brightwater leveraged flexibility in implementation. They used trials and troubleshooting to maximize their success, and identified several potential strategies to improve outcomes, including an interim alkalinity feed system at South Plant.

As a result, WTD complied with the PSNGP in 2022 by staying more than 10 percent under the action level. Lessons learned from the first year optimization planning will be shared, along with a discussion of how WTD is planning to build and operate under an adaptive management framework for optimization planning and implementation.

Presenters

Patrick Roe

Senior Project Manager

HDR Engineering

Pat Roe is a Senior Program Manager in HDR's Bellevue, WA office. He has 43 years of consulting experience helping utilities plan, design and construct wastewater treatment facilities.

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Ashley Mihle

Senior Planner

King County Wastewater Treatment Division

Ashley Mihle is Senior Planner with King County's Wastewater Treatment Division's Treatment Planning Program. She currently leads the Wastewater Treatment Division's planning efforts for the Puget Sound Nutrient General Permit, including optimization and the Nutrient Reduction Evaluation. Ashley has a Master of Science and a Master of Public Administration from the University of Washington. She has over fifteen years of experience in strategic planning, project management, environmental compliance.

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Seattle, WA

Carol Nelson

Process Analyst

King County Wastewater Treatment Division

Carol Nelson is a Process Analyst for King County's Wastewater Treatment Division with decades of experience. Carol is currently leading the Brightwater Treatment Plant's optimization efforts, including a low dissolved oxygen trial and serving as a subjec

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Woodinville, WA

Curtis Steinke

Process Engineer

King County Wastewater Treatment Division

Curtis Steinke is a Process Engineer with over 27 years' experience for King County's Wastewater Treatment Division. He is currently leading South Plant's optimization effort to meet the Puget Sound Nutrient General Permit's total inorganic nitrogen limit

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