American Water Works Association - Hawai'i Section
Hawai'i Water Environment Association
2023 Pacific Water Conference | February 8–9, 2023
Hawai'i Convention Center | Honolulu, Hawai'i

PRESENTATION **1**

9:00 A.M. ROOM **311** WED., FEB 8

EVALUATING TRENCHLESS REHABILITATION TECHNOLOGIES

Dan Shafar & Sarah Merrill
WSP USA

Trenchless rehabilitation of sanitary sewers is a cost-effective method to renew existing systems. Increasingly there are more vendors and technologies for engineers to choose from. It can be difficult to balance the often competing needs to reduce construction impacts, cost, schedule, and access constraints. This presentation will review two project case studies which considered varying rehabilitation methods for 8-inch to 66-inch diameter sewer mains. The project included a selection of cured in place pipe lining, spiral wound pipe rehabilitation, pipe bursting, horizontal directional drill and micro-tunneling for final design of different segments of the projects. This presentation will discuss methodologies used for pipe assessment, alternatives analysis, and how we used a net benefit cost ration to select the final preferred alternative.

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PRESENTATION **2**

9:00 A.M. WED., FEB 8

ROOM **312**

IMPLEMENTING A PFAS ROADMAP IN A CHANGING REGULATORY ENVIRONMENT

Joanie Stulz
Brown and Caldwell

New per- and polyfluoroalkyl substances (PFAS) regulations with more stringent health advisory levels and a longer-list of PFAS compounds are changing the regulatory landscape for drinking water utilities. EPA is expected to release a draft maximum contaminant level (MCL) for several PFAS compounds in the fall of 2022. PFAS is routinely mentioned in the news, leaving questions in the mind of the public of whether there water system will be impacted by these "forever chemicals".

With more stringent PFAS requirements in effect, it is important to be proactive to understand if it is an issue for your water system. Utilities will sample for 29 PFAS under the Fifth Unregulated Contaminant Monitoring Rule (UCMR5) at method detection limits (MDLs) an order of magnitude lower than UMCR3. Water systems that were non-detect may find detections under UMCR5. This presentation will provide examples of PFAS roadmaps that other utilities have implemented to navigate this new regulatory hurdle.

Understanding available technologies for PFAS treatment and drivers for technology selection is a critical step to develop a utility-specific PFAS roadmap. This presentation will focus on the aspects of treatment selection for PFAS management, and cost trade-offs through several case study examples. Case studies will provide example economic evaluations of both capital and O&M costs for granular activated carbon (GAC) and ion exchange (IX) and introduce site specific considerations that could impact treatment decisions. Strategies for sampling and communicating results with the public, as well as funding opportunities will be discussed.

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PRESENTATION **3**

9:00 A.M. WED., FEB 8

ROOM **314**

MEASURING ONE WATER SOURCES: A SELF-ASSESSMENT FRAMEWORK FOR ONE WATER CITIES

Inge Wiersema, Jaquelin Mutter, Mazdak Arabi
Carollo Engineers, Carollo Engineers, One Water Solutions

The One Water movement has inspired many cities, utilities, and professionals to take a more integrated and holistic approach to address our increasingly complex water management challenges. The water sector is evolving fast, and "One Water" has become standard vernacular to reflect a new approach to watershed-based solutions that values all types of water and promotes broad collaboration. Although the definition of One Water is dynamic based on local conditions and drivers, there is a clear understanding that key elements of any One Water approach involve more holistic thinking, consideration of the entire water cycle, inter-agency and cross-sector collaboration, and more resilient and sustainable strategies that benefit urban, rural, and ecosystem water needs. And because both the definition and the One Water Field is inherently broad, it is even more challenging to define metrics to measure One Water success.

This presentation summarizes the findings of a research project initiated by the Water Research Foundation that resulted in the development of a self-assessment ratings system and framework for One Water Cities. The project consisted of four key efforts: 1) an international literature review, 2) expert interviews with a diverse mix of cities in the US and Canada, 3) a national water sector survey, 4) development of the self-assessment rating system and rating tool. The project was a 2-year collaborative effort of academia, water sector professionals, ISI, and 20+ progressive cities active in the One Water Field, including Honolulu.

The final self-assessment framework includes a broad set of outcome-oriented indicators and metrics to measure progress toward implementing the One Water approach, by which cities can evaluate their One Water strategies, practices, and outcomes against appropriate expectations of performance. The self-assessment framework measures progress for 5 categories; One Water Planning, Organizational Culture, Stakeholder Engagement, Informed Actions, and One Water Monitoring. The framework guidebook defines clear expectations for each category on how to progress from level 1 (Onboarding) to level 2 (Progressing) and level 3 (Advancing). The presentation will include a live demonstration of the self-assessment framework tool using interactive input from the audience. The audience will gain a solid understanding of how this self-assessment framework can guide One Water management actions for their own city, utility, or clients.

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PRESENTATION **4**

9:00 A.M. WED., FEB 8

ROOM **315**

OPTIMIZE YOUR FINAL EFFLUENT BELOW YOUR REQUIRED PERMITTED LEVELS & SAVE MONEY

Paul A. Nelsen
Egger Pumps & Iris Valves

Regulatory Compliance Matters!

Iris Process Control Valves will optimize your final effluent (phosphorous & nitrogen) below your required permitted levels.

Since 1979, Iris valves have been the leader in BNR Process Control offering the highest possible accuracy, unmatched repeatability, and reduced energy consumption.

Linear Flows: Iris provides nearly perfect linear flow (1:1 valve position to flow rate). The Iris valve makes it possible to have nearly 10 percent flow at 10% open, 35 percent flow at 35% open, and upwards of 85 percent flow at 85% open.

Accuracy & Repeatability: similar to the aperture on a camera. As the Iris closes, the air is directed through the center of the pipe (point of highest velocity) helping to minimize flow disturbances (turbulence) while improving accuracy & repeatability resulting in stable control of your process.

Energy savings: can be enjoyed simply by replacing your butterfly valves on each of the diffuser droplegs. This will automatically reduce the pressure drop across each valve by 0.35 to 1.0 psig. & enable you to lower your blower's discharge pressure by this amount. In fact, a 10 percent reduction in operating pressure from 9.5 to 8.65 psig is possible.

Lower DO Setpoint: the Iris valve provides tighter regulation (lower peak to peak amplitude) which will help reduce your dissolved oxygen "DO" setpoint by > 0.5 MG/L. Often customers can reduce their process setpoint 15 to 20 percent from 3.0 to 2.5 MG/L.

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PRESENTATION **5**

9:00 A.M. WED., FEB 8

ROOM **316A**

PIPELINE CONTINGENCY PLANNING AND SELCTION OF MECHANICAL REPAIR FITTINGS

Mike Scholz
JCM Industries Inc.

Target audience: Anyone involved in the design, construction, and repair of sewer and water systems

CEU relevancy: This presentation is focused on furthering the education of Pipeline Contingency Planning, understanding the types of pipe damage that may occur, the proper selection and installation techniques of mechanical products for all types of pipes while limiting service disruptions by avoiding pipeline shutdowns.

Abstract: The key to a successful and timely repair in the event of a pipeline emergency requires a well-planned contingency program, recognizing different types of pipe damage, and the ability to select the correct mechanical product. A successful repair requires supplying critical application data to correctly choose repair, connection, and branching products. This presentation will provide an overview of water pipeline system documentation, a list of questions that mechanical product manufacturers require to supply the correct product for the application, installation tips and techniques of products recommended, and examples of field installations.

Description: This presentation discusses documenting water system information, types of pipe damage that may be encountered, application information required for a successful repair, selection of mechanical products, installation tips and tricks, and in-field case studies. The selection of mechanical products for repair, connection, and branching will cover all types of pipes, including HDPE, Ductile Iron, Steel, PVC, AC, RCP, and CSSP. Participants are encouraged to ask questions and share experiences during the presentation.

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PRESENTATION **6**

9:35 A.M. WED., FEB 8

ROOM **311**

HOW A CONTINUOUS FEED SBR WITH CONTROLLERS CAN SAVE ENERGY AND OPTIMIZE PROCESS

Payal Shah
Sanitaire Xylem, Inc.

A Sequencing Batch Reactor (SBR) is a type of Conventional Activated Sludge (CAS) process for biological secondary wastewater treatment. In the SBR system, all unit processes namely BOD and Nutrient removal and secondary clarification carried out in single reactor in place of separate tanks. The time-based sequence in place of separate treatment tanks reduces pumping and piping/operational complexity and allows flexibility in operation with changing influent conditions. The "continuous flow / intermittent decant SBR" is an advanced SBR system that provides more operational flexibility with reduced footprint, and efficient nutrient removal due to a continuous carbon source. The continuous flow/intermittent decant SBR incorporates simple gravity flow based electro mechanically actuated active decanter to handle higher peak hydraulic flows without reducing aeration time or adding tank volume.

The continuous flow SBR system is a well-developed and fully automated system. Minimal operator attention is needed as the control system automatically coordinates equipment operation through various phases of the SBR cycle. An available smart controller that utilizes an Ammonia probe for real time measurement saves energy by turning off aeration during low load conditions, such as during night time when effluent Ammonia requirements can be met using less oxygen.

Maintaining healthy biomass is challenging for any activated sludge process operation due to constant variation in temperature , flow and load. An available smart controller can maintain the biomass inventory/Solids Retention Time at an optimum level by automatically adjusting the amount of biosolids wasted. A smart solids management controller can provide improved stability of plant operation, improved settling characteristics, and reduced energy use by matching the aeration rate to the demand. A smart solids management controller utilizes measurements of the in-basin TSS concentration value, along with measurements of the WAS line flow and TSS concentration, to measure and control biomass.

This presentation will cover fundamentals of biology of an activated sludge system, followed by an overview of a continuous flow SBR system operation with advanced controllers. The combination of a continuous flow SBR system along with advanced controllers is win-win situation for any plant to meet consistent effluent parameters and save energy. The presentation concludes with a case stories of full scale plant.

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PRESENTATION **7**

9:35 A.M. WED., FEB 8

ROOM **312**

PFAS TREATMENT AND LESSONS LEARNED FROM A YEAR-LONG PILOT STUDY

Samantha Black
HDR

Per- and poly-fluoroalkyl substances (PFAS) are compounds of emerging concern in the water industry. PFAS are persistent and stable in the environment due to the strong chemical bond between carbon and fluorine. This utility case study detected PFAS in finished drinking water during the Third Unregulated Contaminant Monitoring Rule with perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) sometimes exceeding 100 nanograms per liter. With the inevitable PFOS and PFOA regulations and recently lowered lifetime Health Advisory Levels, the utility desires the design and construction of a full-scale process to treat PFAS.

To identify an optimal PFAS treatment process technologies should be evaluated using site-specific conditions. Research has shown PFAS treatment effectiveness varies depending on the water source, pretreatment processes, and operations. Therefore, a technology that works for one utility may not work for another. Additionally, treatment effectiveness depends on feed water quality. Testing under site-specific conditions prior to full-scale design of PFAS treatment systems is crucial.

A year-long pilot study evaluating PFAS removal from surface water using granular activated carbon (GAC), ion exchange (IX), nanofiltration (NF) membranes will conclude in September of 2022. Pilot testing GAC and IX involved evaluating multiple media types and operating conditions and observing PFAS breakthrough through the media bed. The NF pilot simulated full-scale design and operated under various recoveries ranging from 80% to 90% while tracking PFAS at sample locations throughout the unit.

Additionally, a pilot unit has been in operation to evaluate PFAS treatment from membrane pilot concentrate using multiple GAC and IX under varying empty bed contact times. In addition to PFAS treatability, these pilots have explored full-scale treatment feasibility, treatment of secondary water quality parameters (e.g. 1,4-dioxane, manganese, organics), and operational requirements. This presentation will provide a background of the PFAS challenges the utility has faced and is addressing, the set up and operation of three pilots, and PFAS treatability from surface water using GAC, IX, and NF. Additionally, this presentation will review the set up and results of pilot testing membrane concentrate with GAC and IX. A year's worth of piloting lessons learned will be shared.

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PRESENTATION **8**

9:35 A.M. WED., FEB 8

ROOM **314**

PRACTICAL APPROACHES TO MEET UTILITY AND COMMUNITY NEEDS

Lenise Marrero, Rosey Jencks, Julia Schmitt & Erin Cox
Brown & Caldwell

For many, One Water can carry an overwhelming undertone: an effort commonly perceived as a multi-year, costly endeavor to develop an improved integrated resource plan. While a few efforts could fit this description, we have witnessed time and again how adaptable and scalable One Water can be.

This paper will focus on breaking down One Water into practical and actionable approaches that can constitute a menu of options for utilities, agencies, communities or cities, from large-scale strategies to neighborhood-scale solutions.

Largely, One Water entails recognizing and harnessing the value of water to achieve social, economic, and environmental benefits. Each organization can approach One Water from a different angle depending on unique local priorities and drivers, starting with simple actions to meet the highest priority goals and incremental changes to make headway towards an integrated One Water model.

This paper will cover One Water actions/approaches that could be embedded into best practices and incrementally transform organizational culture including:

- Diversifying water supply portfolios and optimizing the water cycle by capturing, conserving, and reusing water
- Connecting internal stakeholders, processes, planning, and permitting
- Bringing in external local and regional stakeholders and building relationships with diverse public stakeholders
- Engaging and prioritizing solutions for disadvantaged communities
- Meeting multiple agency and community goals through water infrastructure investments
- Streamlining permitting and policies
- Collaboratively developing project, policy, and program solutions

Projects: This paper will offer example projects/efforts that have applied One Water approaches to address diverse challenges including:

- Disadvantaged communities facing frequent flooding
- Regional stormwater management
- Drought stricken communities with highly impacted supplies
- Complex governance structures
- Land management practices and end-user incentives

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PRESENTATION **9**

9:35 A.M. WED., FEB 8

ROOM **315**

POST-COVID TRASH LOADING PROVES SEWAGE PUMP CLOG RESISTANCE CANNOT BE PREDICTED

Robert Domkowski
Xylem, Inc.

The number one requirement of a solids-handling wastewater pump is its ability to pump unscreened sewage without clogging. The ever-increasing collection system loading rate exacerbated by the effects of COVID-19 further exposes the traditional multi-channel solids-handling impeller as unable to operate without partial to full clogging with soft solids.

A wastewater pump's impeller through let size has been frequently used to specify clog resistance, despite data that demonstrates the irrelevance of this measurement, especially when considering handling modern wastewater containing non-dispersibles and FOG. Several published guidelines recommend a minimum impeller through let size based upon decades-past ideas. Pump clogging is a critical and highly undesirable operational problem in wastewater pumping, which results in increased operational and maintenance costs (OpEx) necessitating emergency calls from the end user utility. Clogging drastically reduces pump efficiency, causing increased energy consumption while pump unit mechanical damage to the bearings, seal and shaft unit can result.

This paper will review the historical impeller design perspective as well as discuss the successful modern-day design concepts. The presenter will also establish how a pump's through let size has been shown to be a very misleading parameter in specifying solids-handling pump unit clog-resistance. The attributes of various traditional solids-handling impeller type will be reviewed. Finally, attendees will be provided with guidance regarding the importance of a modern solids-handling pump's wet-end design for achieving successful clog-free pump operation while enjoying sustained high hydraulic efficiency and low cost of operation.

Short Summary of Paper:
One leading result of the COVID-19 pandemic has been the significant increase in the mass loading of Modern Trash being experienced in municipal collection systems. Ratepayers have fully expanded the breadth of "items that should not be flushed" introducing near-any cleaning wipe, rag and paper towel into collection systems nationwide disrupting normal operations. This presentation reviews the current collection systems situation, examines the challenges that conventional solids-handling pumps cannot overcome, previews laboratory clog testing results and delivers successful solutions proven to minimize disruptions and reduce OPEX.

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PRESENTATION **10**

9:35 A.M. WED., FEB 8

ROOM **316A**

PIPE BURSTING REPLACEMENT OF 9,000 FEET OF BOTH WATER AND SEWER MAINLINES

George Mallakis
TT Technologies, Inc.

The City of Eureka, CA bid a pipeline replacement project in 2021 to open cut and replace their aging water and sewer mains to improve their infrastructure. Mercer Fraser Company, a local pipeline contractor with pipe bursting experience requested to use this trenchless method instead of traditional open cut to minimize disruption, increase productivity, and minimize carbon emissions as an added "Green Benefit". Learn about the pipe bursting process and benefits for mainline and laterals.

The City of Eureka, CA is bordered on one side by beautiful and functional Humboldt Bay, and on the other by mountains lush with giant redwoods and a population of about 28,000 residents. The City Bid a pipeline replacement project in November 2020 to open cut replace approximately 5,500 lf of water mains and approximately 3,600 lf of sewer mains. Mercer Fraser Co., a local pipeline contractor was the low bidder at a little over $3M. Mercer Fraser offered to use Pipe Bursting technology to replace these mains instead of open cut to minimize disruption, increase productivity, and minimize carbon emissions as an added "Green Benefit". They will replace 5,500 lf of existing 8" cast iron water mains with 8" fusible PVC (FPVC) and 3,600 lf of existing 8" vcp sewer with 8" HDPE. In addition to using pipe bursting to replace the sewer and water main lines, they will use pipe bursting to replace the home and business sewer laterals, while using split & pull trenchless techniques to replace water services in place and horizontal boring tools to install new water services.

Learn about the trenchless methods used, bypassing systems, the process, and the benefits.

PRESENTATION **11**

9:35 A.M.

EXHIBIT HALL

WED., FEB 8

AUTOMATIC CONTROL VALVE MAINTENANCE & UPGRADES

Paul Palubicki
Cla-Val

We will cover automatic control valve theory & operation, as well as provide troubleshooting tips and an overview of basic servicing of the control valve and pilot system. We'll also discuss upgrades to the valve that assist with isolation, troubleshooting, and well as electronic data acquisition & reporting options.

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PRESENTATION **12**

10:50 A.M. WED., FEB 8

ROOM **311**

QUALITY OF BIOGAS DERIVED FROM CO-DIGESTION OF WASTEWATER SOLIDS AND ORGANICS

Gavi Subramanian
Kennedy Jenks Consultants

Several WWTPs have been practicing co-digestion with FOG or food wastes to increase biogas production and subsequent energy. One of the less researched side effects 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.

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PRESENTATION **13**

10:50 A.M. WED., FEB 8

ROOM **312**

PFAS REGULATION IN DRINKING WATER: FEDERAL AND STATE PRESPECTIVES

Anna Yuen & Zhaohui Wang
US EPA Region 9 & Hawaii Department of Health

The presenters will provide the federal perspective and state perspective on upcoming PFAS regulation in drinking water. Discussion on the proposed PFAS rule will include key requirements of the rule and on which aspects EPA is looking for public comment. Presenters will also discuss UCMR3 results, the potential tie to UCMR5, the accepted PFAS test methods and labs, the treatment technologies to remove/reduce PFAS, and the preparatory steps that water systems can take.

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PRESENTATION **14**

10:50 A.M. WED., FEB 8

ROOM **314**

ONE WATER HONOLULU-BUT FIRST, COLLABERATION-PART 1

Barry Usagawa, Matthew Gonser, Dawn B. Szewczyk, Roger Babcock
Honolulu Board of Water Supply, CCH Office of Climate Change, CCH Dept. of Facilities Management, CCH Dept. of Environmental Services

One Water Honolulu views the urban water cycle as "one integrated resource." This includes stormwater, wastewater, groundwater, seawater, freshwater, graywater, and recycled water. The City's infrastructure is part of the urban water cycle, including roadways, buildings, parks, trees, treatment plants, pumping stations, and water distribution, drainage and wastewater collection systems. Managing the urban water cycle includes: Adapting critical coastal infrastructure to rising sea level, building climate resiliency in City services and finding ways to maximize efficiencies, minimize waste, and integrate management of water resources across freshwater, stormwater, and wastewater.

The One Water Panel includes representatives from the Office of Climate Change, Sustainability and Resilience (CCSR) and 8 different city departments. The panel meets regularly to collaborate on project opportunities, climate-resilient water management strategies, resilient infrastructure design and planning.

One Water Honolulu prioritized institutionalizing collaboration first by establishing a One Water Ordinance (Ord 20-47) to support coordinated development and implementation of One Water and climate resilience planning, establishing a One Water Panel to consult on city projects, updating codes and design standards and integrating planning as well as executing a Memorandum of Understanding (MOU) amongst City departments enable sharing of resources and establishing commitments around One Water.

This panel with members from the One Water Honolulu Panel will discuss the approach, what has been established and what is the road ahead for One Water Honolulu.

This session is moderated by Christin Reynolds, One World One Water, LLC.

HWEA

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PRESENTATION **15**

10:50 A.M. WED., FEB 8

ROOM **315**

BIOAUGMENTATION AND REHABILITATION OF FACULATATIVE LAGOONS, MOLOKAI

Virgil Vienes, Rhonda Harris & Dimitris Chysochoou
TradeWorks Environmental Inc.

Facultative lagoons have been used for over 90 yrs to treat municipal wastewater in the US. While this technology provides multiple advantages, such as the energy efficiency and ease of operation, these systems also come with some limitations. As these systems age, their performance may start to deteriorate due to sludge accumulation. This can result in falling out of compliance with regulations. Typically, these problems are targeted through the removal of the sludge, via mechanical means such as dredging, or other similar economically and environmentally intensive activities. In addition, these actions can be deemed impractical or unfeasible for communities existing in remote islands, and/or have limited funds available. This abstract explains the systematic rehab of 2 facultative lagoon-based systems with more than 25 yrs of continued operation, located in a remote island of Hawaii. While both systems are located on the same island, they have different challenges to overcome, primarily due to the unique micro-climate existing in the area. Yet, both systems were not able to produce effluent water that would meet the effluent criteria. The work undertaken for these systems concentrated on optimizing the systems in a staged manner. The first step was to increase the microbial activity of the systems by integrating a bioaugmentation technology [Ydro Process®] and assist with degrading the accumulated organic sediment in the ponds as well as enhance their performance. The second step was to install baffles at the final ponds. This way, the algae would be maintained in the areas where it was needed, and it would not leave with the effluent, contributing this way in higher TSS and BOD levels. The next step was to install an ultrasonic algae management system, prior to the effluent structure. This way, the leftover algae as well as any algae that was able to grow at this stage, could be prevented from continuing to grow. Thus far, the implementation of the steps mentioned above, were able to significantly reduce the effluent TSS and BOD values. For the past year, the BOD values have been consistently below the effluent criteria values. Although the TSS have yet to be brought to the desired levels consistently. This is a result of the leftover dead algae in the final compartment that contributes to TSS levels. The final step to prevent the TSS from leaving with the effluent water is the installation of a filter, as a final treatment stage.

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PRESENTATION **16**

10:50 A.M. WED., FEB 8

ROOM **316A**

DEMANDS FOR HIGH PERFORMANCE SPECIALITY COATINGS

Gregory Wallace
Imeryx

This presentation offers a detailed explanation of the mechanism of corrosion specifically found in a water and wastewater environments along with real field experiences, supported with photos of before and after installations, with an explanation of why the coating failed. As the owners and operators realize they need to address biogenic corrosion in their own collections systems and leak mitigation in water structures, well directed questions need to be answered with technically supported experience and data in an effort to wade through the available options for future structure protection. This presentation will enhance the knowledge of the operator/designer/engineer and allow them to make an educated decision for their next project. Real field practices are discussed.

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PRESENTATION **17**

10:50 A.M. EXHIBIT HALL WED., FEB 8

ADVANCED GRIT SEPARATION SYSTEM

Simon Schmauber
HUBER SE

The main reasons for the removal of grit in municipal waste water treatment plants is for example to reduce the wearing in pumps, pipework, sludge dewatering equipment and to avoid settlements in the biological stage, pipework's or the digester. In total, it is about reducing operation problems and costs for maintenance and spare parts.

Talking about advanced grit separation systems is about the removal of fine grit and high grit loads coming from coast areas for example. Depending on the area of the municipal waste water treatment plant the grit grain size averagely reaches down to 200 µm at a "standard" plant. However fine grit from coast area is by its German definition acc. DIN EN ISO 14688 between 75 – 212 µm (70 – 200 mesh].

The HUBER advanced grit separation system GRITWOLF for example is able to remove with an efficiency of 95% for particle size of ≥ 75 µm (= 200 mesh). In addition to that, the system is able to remove FOG scum in a maximum efficient way.

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PRESENTATION **18**

11:25 A.M. ROOM **311** WED., FEB 8

SUCCESSFUL CASE STUDIES FOR BIOGAS USE IN PIPELINES AND FOR VEHICLE FUEL

Becky Luna & Tyler Dougherty
Carollo Engineers,

As water resource recovery facilities (WRRFs) strive to be increasingly financially and environmentally responsible, many are evaluating options for the beneficial use of biogas produced by the anaerobic digestion process. The majority of facilities that operate anaerobic digesters use a portion of the biogas for heating, and flare the rest, thereby wasting a potential resource. While combined heat and power (CHP) has been used to convert biogas into electricity and process heat at some WRRFs, the capital cost of CHP equipment coupled with relatively low electricity prices throughout much of the country means CHP is often not financially viable. With the help of the EPA Renewable Fuel Standard (RFS) program, and, in some cases, California's Low Carbon Fuel Standard program, conversion of biogas to renewable natural gas (RNG) for vehicle fuel and/or pipeline injection has become economically attractive. RNG projects are not only financially viable, but can be a long-term revenue source for WRRFs.

Since RNG projects can provide a significant revenue stream, this opens the door to alternative financing approaches. This presentation will outline different funding opportunities and project delivery methods, and will provide case studies illustrating the impact of project delivery and financing on long-term revenue generation. Sensitivity analyses will be presented to illustrate impacts of changing renewable identification number (RIN) values on revenue projections.

Site-specific factors, including proximity to potential RNG consumers, utility size, and existing gas quality, can have a significant impact on the best use for biogas at each WRRF. This presentation will present lessons learned and considerations for your facility in the design, construction, startup, and commissioning of two biogas to RNG projects. The first project, at the South Platte Water Renewal Partners, came on-line in October 2019 and was the first in the state of Colorado to inject RNG from a WRRF into a natural gas pipeline. The second project, at the City of Longmont, came on-line in March 2020 and uses RNG produced at the WRRF in the City's sanitation fleet.

With the help of the RFS program, conversion of biogas to RNG is an economically attractive option for WRRFs to beneficially use biogas and reduce greenhouse gas emissions. This presentation will guide the listener through considerations from planning and financing through commissioning and start-up of biogas to RNG facilities.

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PRESENTATION **19**

11:25 A.M. WED., FEB 8

ROOM **312**

1, 2, 3-TCP AND PFAS COMPOUNDS REMOVAL: FROM PILOT STUDY TO PLANT INSTALLATION

Kelsey Hakes
Aqueous Vets

In California, several well sites and treatment plants face the challenge of treating emerging PFAS compound contaminants while simultaneously designing to treat competing contaminants, such as 1,2,3-TCP. A water agency in Southern California began looking at treatment for their groundwater supply when they started to see levels of 1,2,3-TCP approaching the MCL of 5 ppt. The district was then required to test for PFAS compounds as part of the state's program to find areas with contaminated groundwater, which resulted in the discovery of several PFAS compounds in their water supply. This technical session will detail the process the district went through to evaluate the best solution for the dual application. This included running a pilot for different granular activated products/materials (GAC) and sharing their resulting data. The unique part of this pilot was the use of a shorter Empty Bed Contact Time (EBCT) than typically used in a lead vessel for PFAS removal; an EBCT of 5 minutes was applied versus the industry standard of a minimum of 10 minutes per vessel. The other significant outcome of the data was how it proved PFOA to be the driver for carbon change-out, with initial breakthrough before 1,2,3-TCP. This was important because coconut carbons are commonly used for 1,2,3-TCP removal, which put into question whether coconut carbon or coal carbon would be best for the dual application of 1,2,3-TCP and PFAS compounds removal. The findings show the coal carbon to be the better fit. After reviewing the pilot data, a review of the full-scale design will be explained, referencing the selection of the external ring header mechanical design for the GAC systems. Lastly, there will be a discussion on the volatility of the materials market through the last year and how costs have gone up exponentially, affecting their budget. A pre-procurement package for the GAC systems bid back in May 2021 saved them a significant amount in costs compared to if they had waited to bid the treatment systems with the general contractor's package. The project has been successfully installed and online since late August 2022.

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PRESENTATION **20**

11:25 A.M. WED., FEB 8

ROOM **314**

ONE WATER HONOLULU-BUT FIRST, COLLABERATION-PART 2

Barry Usagawa, Matthew Gonser, Dawn B. Szewczyk, Roger Babcock
Honolulu Board of Water Supply, CCH Office of Climate Change, CCH Dept. of Facilities Management, CCH Dept. of Environmental Services

One Water Honolulu views the urban water cycle as "one integrated resource." This includes stormwater, wastewater, groundwater, seawater, freshwater, graywater, and recycled water. The City's infrastructure is part of the urban water cycle, including roadways, buildings, parks, trees, treatment plants, pumping stations, and water distribution, drainage and wastewater collection systems. Managing the urban water cycle includes: Adapting critical coastal infrastructure to rising sea level, building climate resiliency in City services and finding ways to maximize efficiencies, minimize waste, and integrate management of water resources across freshwater, stormwater, and wastewater.

The One Water Panel includes representatives from the Office of Climate Change, Sustainability and Resilience (CCSR) and 8 different city departments. The panel meets regularly to collaborate on project opportunities, climate-resilient water management strategies, resilient infrastructure design and planning.

One Water Honolulu prioritized institutionalizing collaboration first by establishing a One Water Ordinance (Ord 20-47) to support coordinated development and implementation of One Water and climate resilience planning, establishing a One Water Panel to consult on city projects, updating codes and design standards and integrating planning as well as executing a Memorandum of Understanding (MOU) amongst City departments enable sharing of resources and establishing commitments around One Water.

This panel with members from the One Water Honolulu Panel will discuss the approach, what has been established and what is the road ahead for One Water Honolulu.

This session is moderated by Christin Reynolds, One World One Water, LLC.

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PRESENTATION **21**

11:25 A.M. ROOM **315** WED., FEB 8

FOCUSING ON SUSTAINABILITY AND AFFORDABILITY WITH MEMBRANE TECHNOLOGY

Maria Hamlin
Ovivo USA

While we continue to be challenged with lean economic and site conditions, which significantly impact capital investments for new infrastructures, our water and wastewater treatment demands increase with the rapidly growing population, and existing facilities are approaching their limit or becoming outdated. Increased water demand is requiring businesses and communities to become frugal with their water resources and implement sustainable water conservation and reuse strategies. Meanwhile, local environmental regulations require meeting stricter advanced treatment effluent limits, to reduce environmental pressures and protect the environment.

Membrane bioreactor systems can actually provide an affordable, simple-to-use solution to new and existing facilities facing environmental, regulatory and/or budgetary challenges. In addition to high quality of effluent, Membrane Bioreactor (MBR) technology has proven to offer great advantages:

- MBR technology drastically reduces system footprint requirements.
- MBR technology allows increasing plant capacity for existing infrastructures with minimal changes, while maintaining the existing facility operational if required, and driving down lifecycle costs.

The desire for high quality effluent combined with spatial site constraints makes membrane bioreactor (MBR) technology the best available technology for wastewater treatment, and reuse applications. The MBR process operates at a higher mixed liquor suspended solids concentration (MLSS), than a conventional wastewater treatment system, typically 8,000 mg/L to 12,000 mg/L, which dramatically reduces the tank volume required to achieve treatment, and ultimately the overall footprint. A Membrane Bioreactor (MBR) system is a biological process that combines a suspended growth activated sludge system utilizing low pressure membrane filtration for solid-liquid separation, typically ultrafiltration submerged membranes. In typical configurations, membranes are housed in modules that are assembled into cassettes and installed in a tank (called an MBR tank). Air is introduced through integral diffusers which provide air scouring of the membrane surface during filtration, mixes the tank and also provides oxygen to the biological process. MBR technology can be applicable to new or existing wastewater treatment plants as well. Using MBR technology for new plants, or to upgrade or rehabilitate existing facilities is good for the environment and for saving money.

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PRESENTATION **22**

11:25 A.M. ROOM **316A** WED., FEB 8

ABC'S OF VFD

Chris Dugas
ABB

Although Variable Frequency Drives (VFDs) are common in water and wastewater treatment plants for collection and distribution systems, the value they provide and how to properly select and use them are often not fully understood. This presentation will demystify VFDs, providing a better understanding as to where and why you would use them. Attendees will leave with the ability to:

- Be aware of safety considerations.
- Identify applications that can benefit from VFDs.
- Understand the inherent value they provide.
- Recognize what needs to be considered to appropriately size and select VFDs.
- Be aware of proper installation considerations for a successful solution.

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PRESENTATION **23**

11:25 A.M. WED., FEB 8

EXHIBIT HALL

STRATEGIES TO COMBAT PIPELINE SETTLEMENT

Jonathan Leitch & Chris Sundberg
Victaulic

Pipelines may experience differential settlement having adverse effects on reliability of any water or waste-water system. Settlement may occur near hydraulic structures such as pumping stations, clarifiers and valve vaults where pipelines traverse hard/soft foundation conditions. Settlements occur as a result of varying soil conditions that may not be obvious without a soils investigation and expert geotechnical knowledge. Compaction of soils can reduce the amount of settlement, however compaction around structures, where pipelines are entering/exiting, is often difficult for contractors to achieve. In an earthquake, some soils may liquefy, causing local loss of soil strength, resulting in settlements. Proper attention to potential settlement and design is necessary to make pipelines function reliably as a safe, integral part of a conveyance system, as intended by the designer

This hands-on demonstration will focus on strategies to combat pipeline settlement that include a direct comparison of several well-known strategies identified in AWWA Manual M11, Steel Pipe-A Guide for Design and Installation including 1) a pair of unrestrained couplings restrained by an M11 harness and 2) Grooved and flexible yet restrained couplings.

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PRESENTATION **24**

1:30 P.M. WED., FEB 8

ROOM **311**

USE IT OR LOSE IT: BIOGAS STORAGE AND USE

Keith Albretsen & Adrian Williams
WesTech Engineering, LLC

Biogas is a valuable yet often underutilized and renewable energy resource. Some plants reclaim a portion of that energy by operating biogas-fueled boilers to heat their sludge and in some cases their plant. Some estimates suggest that a plant can provide between 50% and 67% of its electricity needs through on-site production. The use of a dual membrane gas holder allows plants to store biogas to constantly feed any system they operate that requires the biogas.

Central to the utilization issue is that of biogas storage and pressure regulation, because the first step to using biogas is to store it properly. A dual membrane tank cover provides a unique, modular solution for gas storage in addition to a cost effective and versatile alternative to conventional steel digester covers.

In addition, technology improvements and energy incentive programs allow this technology to be cost-effective even on smaller plants. By coupling effective storage with a biogas utilization program, plants can reduce operating costs and avoid wasting an increasingly valuable energy resource.

This presentation will discuss the potential uses of biogas and review some challenges associated with tapping this resource. Using past projects, we will walk through design considerations, interfacing with other equipment, installation and start up and general operation. The presentation will also touch on lessons learned during all phases of the project, including installation.

WesTech Engineering has been involved in the design, production and startup of Anaerobic Digestion equipment for over 30 years. Using the expertise cultivated at WesTech during these decades with the use of models we will go over the basics of Anaerobic Digestion and the equipment affiliated with it. We will start with discussing the process and why Anaerobic Digestion would be used over other treatment methods. Different methods of Anaerobic Digestion will then be introduced along with some of the benefits and detractors. We would like to emphasize the current shift of plants to going energy neutral and putting energy back into the grid using Anaerobic Digestion. After this we will discuss the equipment and different types of equipment offered in the industry, not just at WesTech, but also a few competitors who do things differently. When this presentation is over the takeaway will be the basic needs for Anaerobic Digestion to happen and the different equipment that are absolutely necessary.

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PRESENTATION **25**

1:30 P.M. WED., FEB 8

ROOM **312**

ASSESSMENT OF GAC AND IX PFAS REMOVAL CAPABILITIES IN WELL WATER

Bob Armstrong, Joseph G. Jacangelo, Henry Croll, Ryan Cappelle, Sarang Agarwal, Kellogg Schwab
Stantec & Johns Hopkins University

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

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ROOM **314**

CURRENT ONE WATER PRIORITIES

Mami Hara
U.S. Water Alliance

No abstract

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PRESENTATION **27**

1:30 P.M. WED., FEB 8

ROOM **315**

SOLID MINIMALIZATION STRATEGIES; MASS AND ENERGY BALANCE EVALUATION

Jerod Swanson
Centrisys-CNP

Reduction of sludge volume can be achieved by enhanced solids stabilization, mechanical thickening and dewatering, and thermal processing to evaporate water. In this presentation, a case study of a typical wastewater treatment plant serving 100,000 people was used to illustrate how these sludge minimization technologies change the mass and energy balance of the wastewater treatment plant. Where the right combinations of equipment are chosen, substantial reductions in sludge volume and hauling costs can be realized without significantly increasing the required manpower or energy demand.

Multiple drivers exist to push the water utilities across the Unites States to seek reduction of sludge production. Reduction of sludge volume can be achieved by enhanced solid stabilization, mechanical thickening and dewatering, and thermal processing to evaporate water. In general, mechanical thickening and dewatering requires far less energy than solid stabilization or thermal processing.

Sludge thickening and introduction of Thermochemical Hydrolysis resulted in the marked reduction in digester volume required for stabilizing sludge. This directly translated to the amount of energy required to operate the digester. Without thickening sludge, most of the energy recovered from the biogas is required to heat the sludge for anaerobic digestion, requiring additional energy for sludge drying. With the utilization of high-level thickening and dewatering, it is possible for the overall energy balance to be neutral. With thickening and the addition of sludge pretreatment such as a Thermochemical hydrolysis process, the overall energy balance is positive.

Overall, it is possible to achieve the reduction in sludge production by utilizing the energy recovered by anaerobic digestion process. Technologies are available to achieve the sludge volume reduction without drastically changing the operation and maintenance demand or chemical cost. When the right combination of equipment is chosen, substantial sludge volume reduction can be realized without significantly increasing the required manpower or energy demand.

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1:30 P.M. WED., FEB 8

ROOM **316A**

DEVELOPING STRATEGIES FOR FINANCIAL RESILIENCY IN UNCERTAIN TIMES

Sanjay Gaur & Marwan Khalifa
Water Resource Economics & Mesa Water District

Water and wastewater agencies are facing unprecedented financial challenges to both revenues and expenditures, which will likely increase in severity in the coming years. This engaging session will discuss policy options available to water and wastewater agencies to enhance financial resiliency in such uncertain times. The panel will provide various policy options available and highlight agency case studies, including Mesa Water District in Costa Mesa, CA, that have successfully implemented financial resiliency strategies to withstand some of the current economic challenges. The discussion will help agencies understand which financial resiliency tools are best suited for their needs, as well as help them develop a strategy to communicate the importance of having a financial resiliency plan to elected officials and stakeholders.

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PRESENTATION **29**

1:30 P.M. EXHIBIT HALL WED., FEB 8

WHAT CAN A SMART ASSEST MANAGEMENT PROGRAM MEAN FOR MUNICIPAL WATER?

Adrian Lupola Sonepar & Janine Nielsen
One Source Distributors

This session will discuss the complex processes that municipal water utilities undertake to manage their assets. Review the key market drivers and inhibitors, successful strategies of early adopting utilities, and best practices of technical solution providers. This analysis is essential for municipalities assessing their capital, equipment, software platforms, and service offerings across the full lifecycle of municipal water assets. There is a shift to smarter, more advanced asset management and predictive maintenance strategies programs to ensure compliance, optimize efficiency, save time and maximize safety throughout your network.

Walk through a Day in the Life of an Operator and discuss the enhancements that a smart asset management and predictive maintenance program can bring. See some of the tools that will enable a more proactive approach to system maintenance and training. Learn how Digitalization can Connect Everything to Everyone, allowing you to take the next steps to optimize your operations by unifying measurements, intelligence, and actions, allowing you to start making more informed decisions.

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PRESENTATION **30**

2:05 P.M. WED., FEB 8

ROOM **311**

USING BENCH-SCALE TESTING TO DETERMINE FEASIBILITY OF FOOD WASTE CO-DIGESTION

Christine Polo, Jan Hauser, Rashi Gupta, Christian Tasser, Alyssa DiGirolamo
Carollo Engineers, City of Oxnard, Carollo Engineers,
Carollo Engineers, Carollo Engineers

The City of Oxnard, CA received an EPA grant to study food waste pre-processing and co-digestion implementation at the Oxnard Wastewater Treatment Plant (OWTP). The City selected Carollo Engineers, Inc. (Carollo) and their partner, Dr. Matt Higgins (Bucknell University) to perform bench-scale testing and evaluate the feasibility of implementing co-digestion at the OWTP.

The bench-scale study consisted of collecting three months of samples of food waste from the City's Materials Recovery Facility (MRF) and samples of sludge from the OWTP. The samples were shipped to Dr. Higgins's lab where they were anaerobically digested over a range of conditions to determine the biogas production potential and the maximum amount of food waste that can be co-digested while maintaining stable digester operations. Preliminary results indicate stable digestion at food waste volatile solids (VS) loadings up to ~40% of total digester VS load. Currently, the digested material is being dewatered and tested for odor production to determine any impacts of food waste co-digestion on these processes. The bench scale study is less than a month from completion and full results will be available at the time of the presentation.

In parallel with the bench-scale study, Carollo evaluated the existing facilities to determine digestion and solids handling capacity available for food waste import. Carollo also performed an alternatives evaluation for three pre-processing technologies to create a food waste bio-slurry suitable for co-digestion. The most suitable pre-processing alternative was then carried forward into an energy analysis based on hourly fluctuations in biogas production, and a cost/benefit analysis to determine the feasibility of a food waste co-digestion program.

As a final step, the results from the bench scale study will be used to refine the assumptions used in the feasibility study.

After this presentation, attendees will be able to:

1. Understand how to identify process and capacity limitations associated with food waste co-digestion, including food waste receiving and pre-treatment, digestion, dewatering, and biogas utilization.

2. Identify food waste pre-processing technology options to produce high quality slurry feed, including slurry quality, layout/location, and cost considerations.

3. Understand the benefits of conducting a bench scale study to determine expected digestion performance and biogas production to refine results of a feasibility study.

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PRESENTATION **31**

2:05 P.M. WED., FEB 8

ROOM **312**

PFAS - CHASING THE REGS WITH TREATMENT

Cathy Swanson & Mike Tallering
Purolite & Environmental Site Solutions

PFAS (per/polyfluoroalkyl substance) regulations are changing for both drinking water and waste water.

This presentation will cover the newest proposed changes at the federal and state level and what these means to the water industry.

For drinking water, the EPA has declared new health advisories for several PFAS and should release proposed MCLs shortly. Additionally, utilities are going to have to start considering UCMR5.

For waste water, the EPA has stated that NPDES monitoring and regulation are also going to include PFAS.

The EPA has also stated their intent to declare PFAS a hazardous substance which affect both drinking water and waste water.

After a review of the regulations, upcoming changes, and implications, we will review best available technologies for treating PFAS including GAC and Ion Exchange. This will be a very practical review with costs and case histories. We will also cover disposal of spent media guidance and options.

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PRESENTATION **32**

2:05 P.M. ROOM **314** WED., FEB 8

THE POWER OF STAKEHOLDER ENGAGEMENT IN TUCSON'S ONE WATER PLANNING

Wendy Broley & John Kmiec
Brown and Caldwell & Tucson Water

It was mid-August 2022 in the midst of a multi-year drought when the Bureau of Reclamation announced 21% reduction in Colorado River water allocations for Arizona communities. That same day, Tucson Water held a townhall with nearly 300 members of their community to learn more about their City's One Water 2100 Master Plan and discuss the City's water resources. With questions on their mind about how the cutbacks might threaten Tucson's water security, the venue served as a perfect platform to address the audience's overwhelming concerns. Director John Kmiec was able to provide an overview of the region's long history of water conservation and water planning, which allows Tucson to save a third of its annual Colorado River allotment each year and has been able to help recharge their aquifer over the past 20 years. This same advanced preparation and conservation is at the heart of the vision for the One Water 2100 Master Plan.

The event served as a kickoff for Tucson Water's public engagement program to obtain input and increase awareness for the plan that will guide the water utility's capital infrastructure planning practices and policy decisions for the next 80 years. Tucson Water has taken the proactive approach of engaging stakeholders from their community at each step of their One Water Planning process, creating strong and vocal champions for Tucson Water's direction within their community.

Beginning with the vision and guiding principles, Tucson Water engaged the Mayor, City Council, and members of their Citizen Water Advisory Committee to better understand the issues a One Water plan in Tucson would need to address. With that foundation, and acknowledging the challenge of preparing for an uncertain future, a diverse group of representatives from within their community participated in a scenario planning process leading to the development of strategies to be considered within the Master Plan itself.

Tucson Water continues to involve the public as a key component of the master plan itself, through surveys, workshops, and public events.

This presentation (or panel) will highlight the benefits and challenges of having a proactive stakeholder engaging approach throughout the One Water planning process.

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PRESENTATION **33**

2:05 P.M. ROOM **315** WED., FEB 8

ADAPTIVE MIXING AND PROCESS OPTIMIZATION WITH ENERGY SAVINGS

Alden Meadel
Xylem Inc.

In the past, mixers have been given little consideration in the grand design of wastewater facilities. Mixers were designed for worst case scenarios, whether flow or loading, and did not provide flexibility to meet changing mixing demands. With an increased focus on energy management and treatment optimization, mixers present an opportunity for both. Many engineers and operators have come to recognize that overmixing not only wastes energy, but provides sub-optimal treatment process results.

Flygt has been conducting a number of adaptive mixing pilot projects around North America. The purpose of the pilot studies was to determine the actual energy needed to provide mixing and the amount of energy savings that can be seen when mixers are "turned down".

In addition to the studies, the basics on mixing will be presented. We will discuss mixing applications, the measurement and importance of thrust, and the energy requirements for mixing.

This presentation is a review of mixing applications, how to evaluate mixers, and how to optimally locate mixers. As well as the Mixer selection process, the measurement and importance of thrust, the measurement and magnitude of energy requirements for mixing, and a method for calculating energy savings resulting from better mixing.

This presentation will be valuable to the listeners because it will provide them with general knowledge on mixers as well as actual practices that they will be able to take back to their facilities. After the presentation they will be able to observe the mixers in their facility to determine if they are optimized for their process as well as if the mixers are operating as intended.

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2:05 P.M. WED., FEB 8

ROOM **316A**

CODE WELDING DETAILS FOR MILTERED ELBOWS

Chris Sundberg
Victaulic

Code compliant welding details for mitered elbows, often left up to pipe fabricators and ultimately the welder, may not be well understood by the engineering community. For example, AWS D1.1 indicates "a decrease in groove angle" constitutes an essential change. For mitered pipe elbows, this has specific implications as to weld joint geometry of complete joint penetration (CJP) butt joint welds, including groove angles and bevels in addition to root face and root openings.

Weld joint preparation for mitered elbows, to be code compliant, requires the weld groove angle remain constant to avoid welding difficulties. For example, a narrow groove angle may result in incomplete penetration (IP) and inability of the welder to adequately clean weld passes, thus trapping slag. Too wide a groove angle results in excessive weld metal, greater weld shrinkage and distortion.

Awareness of seemingly small details, including code welding geometry, can contribute to water project success. Most welders, not being Engineers are ill-equipped to fit pipe that requires complex calculations, so Engineers should make it easy for welders.

In addition to observations and recommendations, this paper will address code welding details required for mitered elbow compliance including example calculations of welding bevels and a chart showing bevel vs rotation angle for mitered elbows with 60-degree single vee groove welds, for various miter deflection angles from 0 to 60 degrees. The chart eliminates complex calculations, making code compliance easier for welders, which benefits the water industry and the public.

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2:05 P.M. EXHIBIT HALL WED., FEB 8

CENTRIFUGE SCROLL DESIGN IMPROVEMENTS AND IMPACT ON BIOSOLIDS DEWATERING COST

Michael Stone
Flottweg Separation Technology Inc.

Decanter centrifuges have been successfully providing excellent solids separation for the municipal wastewater market for over 50 years. The physical principals which govern these systems are simple, increase the gravitational force and the heavier solids will move to the exterior of the machine where they can be collected and removed.

Over the last few decades, various design changes have improved the functionality of these machines. The largest impact to performance has been scroll design, which can improve a centrifuge's performance in regard to cake dryness, polymer consumption; solids capture efficiency, and energy consumption. This paper will address scroll and bowl design innovations of decanter centrifuges for wastewater dewatering and thickening. It will also introduce the latest centrifuge scroll design innovation which has proven to increase throughput by up to 15 %, increase cake dryness up to 10% , and reduce polymer consumption and power consumption by 20%.

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PRESENTATION **36**

3:20 P.M. WED., FEB 8

ROOM **311**

WAIANAE WASTEWATER FACILITIES PLAN PREPARING FOR THE FUTURE

Dustin Yamamoto & Lisa Kimura
Brown and Caldwell & CCH ENV

Brown and Caldwell has worked with the City and County of Honolulu (City) to update its Wastewater Facilities Plan (WWFP) for the Waianae Wastewater Treatment Plant (WWTP) and Sewer Basin on Oahu, and it was recently completed in December 2021. The WWFP evaluated current and future conditions in the Waianae wastewater sewer basin and identified future improvements over the planning period of year 2040. The WWFP evaluated future development and population growth, flow and waste load projections, hydraulic capacity impacts, wastewater characterization and process modeling, condition assessment of WWTP facilities and assets, and energy recovery opportunities.

This WWFP was also the first of the City's facilities plans to incorporate a climate change impacts evaluation, which included projected impacts of sea level rise, coastal erosion, and storm surge to the Waianae wastewater sewer basin facilities and infrastructure. BC then identified climate change adaptation strategies and mitigation measures as well as triggers for implementing these strategies and a planning horizon. The WWFP then developed improvement projects to be used by the City for their near-term, mid-term, and long-term capital improvement planning. The approach and methodologies used to evaluate climate change impacts from this WWFP have been replicated by the City for other facilities planning efforts.

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PRESENTATION **37**

3:20 P.M. WED., FEB 8

ROOM **312**

ZINC COATED DUCTILE IRON PIPE AND THE DESIGN DECISION MODEL

Jeffrey Butters
Ductile Iron Pipe Research Association

Corrosion control is major part of the planning and design of todays ductile iron pipe. A newer tool in the arsenal to combat corrosion is zinc coated pipe. We will go over the history and research of zinc coating and how it fits into the Design Decision Model (DDM).

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PRESENTATION **38**

3:20 P.M. WED., FEB 8

ROOM **314**

THE CHALLENGES OF USING RECYCLED WATER AT THE LARGEST URBAN PARK IN CALIFORNIA

Claudia Llerandi & Barbara Palacios
Kennedy Jenks Consultants & San Francisco Public Utilities Commission

The City of San Francisco has been working on bringing recycled water to the City since the 1980s. San Francisco Public Utilities Commission (SFPUC) adopted a Water System Improvement Program in 2002 to increase the resilience and provide diversification to their water supply system. As a result, the Westside Recycled Water Project was envisioned. The Project will produce 4 million gallons a day of advanced treated recycled water at a new facility located at the existing Oceanside Water Pollution Control Plan (OSP). Recycled water will be used for irrigation of Golden Gate Park and other customers on the western side of San Francisco. This project allows for repurposing existing groundwater wells to augment the City's local potable water supply. Planning and implementing this Project in San Francisco proved to have many challenges. Finding a site for the Treatment Facility: The SFPUC spent five years working with the public, environmental organizations, and City agencies evaluating potential sites for the facility. After failed selections, the existing OSP was selected. This site had it's own challenges, space constraints required creative design of the treatment system. Developing a Recycled Water Distribution Network: While the City is relatively small, it is densely populated, and routing pipelines through City streets is not a straightforward task. Customer Water Quality Requirements: Golden Gate Park has a diversity of ecosystems that require high quality recycled water. For this purpose, treatment selection included membrane filtration, reverse osmosis and ultraviolet disinfection. Retrofitting Golden Gate Park required performing extensive field investigations to develop accurate as-built plans of irrigation infrastructure installed over the last century, examination of aging infrastructure, uncovering leakages, recording unmapped components, and identifying system deficiencies before delivering recycled water to the park. Cross-connection Testing of Golden Gate Park: the detailed as builts developed for retrofitting the park were converted into an interactive webmap GIS app (ESRI Collector) to display locations of pipelines, fixtures, and components that required retrofitting or cross connection testing. The app allowed multiple field workers to accurately locate fixtures in the field, input test results, troubleshoot testing, track test progress, prevent duplicating efforts, manage data and ultimately reduce test cost by 50%.

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3:20 P.M. ROOM **315** WED., FEB 8

IMPACT TO STREAM WATER QUALITY FROM LEGACY OSDS AND SEWAGE EXFILTRATION ON OAHU

Steven Spengler & Marvin Heskett
Pacific Rim Water Resources & Element Environmental

The concentration levels of pharmaceutical compounds and nutrients present in perennial streams, springs and a lake on the island of Oahu, Hawaii were measured under drought conditions between 2020 and 2022. The combined island-wide daily release of wastewater to the environment from the continued use of legacy On-Site Sewage Disposal Systems (OSDS) and from exfiltration from the 3,400-kilometer network of underground sewer lines has been estimated to be somewhere on the order of 80 million liter per day (mld), or around 3.9% of the total island-wide groundwater flux to the ocean.

The 36 streams and 11 springs sampled were located down-gradient of areas with varying densities of OSDS and sewage lines while the lake sampled (Lake Wilson) receives direct wastewater input from the wastewater treatment plant that serves Central Oahu. The streams and springs were collected under low baseflow (<10th percentile of daily discharge on the day sampled) conditions when groundwater input to the streams was dominant, while the lake was sampled when the total water volume in the lake was low due to drought conditions in early 2022.

The average concentration levels of caffeine and carbamazepine measured in storm drains in the coastal tourist destination of Waikiki were 10 and 30 times higher in a prior study than levels measured in Oahu streams and springs in this study. The average sulfamethoxazole and carbamazepine levels measured in Lake Wilson, the only water body on Oahu where treated wastewater is discharged into fresh water, are three to four times higher than average levels measured in the island's streams and springs.

Average pharmaceutical and nutrient levels measured in streams and springs sampled in areas with high densities of OSDS and sewer lines were slightly higher, but not statistically different than concentration levels measured in streams and springs in areas with low densities of OSDS and low sewer line densities. The presence of slightly elevated concentration levels of nitrate and silica in some streams and springs on Oahu predominately reflects the impact of the historical use of up-gradient lands for sugarcane cultivation rather than wastewater input. The trace levels of pharmaceuticals detected in Oahu streams and springs under baseflow conditions suggest that the actual combined input of wastewater to the environment from legacy OSDS and exfiltration from sewer lines is less than 20% the wastewater flux previously estimated.

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3:20 P.M. ROOM **316A** WED., FEB 8

CHEMISTRY OF CHLORINE AND CHLORINE MONITORING

Shaun Sharrett
Swan Analytical USA

Chlorine has been used to disinfect water since the mid 1800's which has greatly improved public health by reducing water borne diseases. Chlorine not only reacts with the biological organisms but also reacts with inorganic species such as iron, and with naturally occurring organic material and ammonia to form disinfection by-products such as trihalomethane and haloacetic acid. Chlorine chemistry is complex and must be understood to properly control. Chloramination is also discussed and compared to chlorination.

This paper discusses the chemistry of chlorine and chloramination chemistry as well as the chemistry of monitoring chlorine and monochloramine and the limitations.

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3:20 P.M. WED., FEB 8

EXHIBIT HALL

PRESSURE MANAGEMENT BENEFITS OF USING REMOTE PRESSURE AND TEMPERATURE MONITORING TO HELP OPTIMIZE YOUR WATER SYSTEM

Shannon Wedding, Colin Reardon, Eric Benson, Richard Ledesma
iHydrant & Clow Valve

As water infrastructure continues to age and main breaks rates increase, utilities are focusing on addressing water loss and becoming more proactive with leak detection. One key intervention to reducing water loss is managing pressure. When pressure is well managed throughout the distribution system it can help reduce main breaks from developing as well as maintaining higher water quality and energy efficiency. But what are the challenges with monitoring pressure system wide and considerations for selecting the best suited technology solution? Various use cases will be discussed that will show how full time remote pressure and temperature data monitoring can be used to optimize system operations.

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ROOM **311**

ORGANIC WASTE SUSTAINABILITY PLAN AT SAND ISLAND WWTP

Heather Stephens, Nicole Imanaka, T.P. Wong & Pooja Sinha
Stantec Consulting Services, Inc. & RM Towill Corp., RM Towill Corp., Stantec Consulting Services, Inc.

The Sand Island Wastewater Treatment Plant (SIWWTP) is owned and operated by the City and County of Honolulu (City) and was originally constructed in the 1970s as an advanced primary treatment plant and has since undergone various upgrades including technology improvements and treatment enhancements. The facility is undergoing a large-scale, two-phase secondary treatment upgrade to address requirements outlined in the First Amended 2010 Consent Decree between the City, the United States Environmental Protection Agency, and the State of Hawaii, Department of Health. The addition of secondary treatment processes through the Phase 2 expansion will increase the amount of sewage sludge created and the available biosolids that can be produced into useful marketable products and potential sources of renewable energy.

An organic waste sustainability plan (OWSP) will be developed as part of this project to serve as a comprehensive master planning document that will establish an island-wide approach to organic waste management (i.e., food waste, green waste, and FOG) to align with City's sustainability and carbon neutrality goals. OWSP will evaluate and provide recommendations for organic waste receiving; treatment process improvements and additions; energy and resource recovery initiatives; and operational changes to support long term organic waste management. Findings of the OWSP will have a significant impact on all major SIWWTP process trains from preliminary treatment through solids handling. There will be reciprocal impacts of decisions and strategies made during OWSP activities and parallel SIWWTP liquid and solids stream planning that will require close coordination.

In this presentation, we will provide an overview of the OWSP, summarize regulatory trends and drivers for the OWSP, review existing end uses for biosolids produced at SIWWTP and potential markets available for the future biosolids/energy beneficial uses. The outcomes of market assessment will provide an understanding of potential technology pathways to be considered for future applications. Information will be shared regarding the development of alternatives to maximize resource recovery at the SIWWTP.

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ROOM **312**

AN INSPECTOR'S JOURNEY THROUGH THE HAWAII DRINKING WATER INDUSTRY

Michael Miyahira
DOH Safe Drinking Water Branch

The sanitary survey program is a required element of the Hawaii DOH Safe Drinking Water Branch's (SDWB) "primacy" status with the USEPA. Primacy endows the SDWB with the implementation and enforcement authority of the USEPA when it comes to the Federal Safe Drinking Water Act (SDWA). Under SDWA, all community and non-community public water systems (PWS) must undergo a periodic sanitary survey, with the frequency depending on whether they utilize a surface water or rain catchment source (every 3 years) or a ground water source (every 3 or 5 years depending on the previous survey findings and other operational performance metrics).

While numerous past presentations on sanitary surveys have focused on the technical nature of our branch's regulatory work, I felt it a good time for all of us to step back - with a different perspective - and admire and appreciate the inherent beauty and preciousness of our Hawaii drinking water industry and its resources through photos taken over my 20 plus years as a sanitary survey inspector.

HWEA

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PRESENTATION **44**

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ROOM **314**

HITTING THE CURVE BALLS: AN INTEGRATED UTILITY WATER RESILIENCY FRAMEWORK

Rachel Garrett & Lauren Armstrong
Brown and Caldwell

In Hawaii and beyond, aging water and wastewater systems are threatened by climate change impacts, unsustainable land use patterns, and natural disasters. At the same time, staffing constraints, diverse stakeholder interests, changing regulations, and lack of funding can delay important programs and projects designed to protect water quality. Across the state, ground water sources are threatened by lack of recharge and contamination from saltwater intrusion and urban pollutants. Inadequate stormwater systems are impacting our marine water quality, and utilities need to identify new funding sources. While some wastewater systems have gone through significant upgrades in recent years, there are still billions of dollars of improvements needed.

These challenges require us to work together create resilient infrastructure for stormwater, wastewater and drinking water. Our communities are counting on us to come up with holistic solutions. The way we frame conversations about water resources can help us find common ground and identify cost-effective alternatives. The first step is to find internal alignment as an agency or organization around challenges and goals. Then, we can build support among stakeholders and elected leaders and secure funding for projects and programs in support of those goals.

This presentation will identify big picture challenges around drinking water, stormwater, and wastewater in Hawaii, and share a case study from the City of Vancouver, WA, a municipality that has used integrated planning to bring stakeholders together to address water resource challenges. Vancouver worked with BC's Strategic Engagement team to develop a Water Resiliency Framework and Strategy to align communications internally and externally with City officials and stakeholders. The process brought together department leaders from finance, management, engineering, planning, and public information. This Framework has bolstered support for long-term investment needs and led to clear funding and financing strategies and rate stabilization recommendations. The integrated framework focuses on how all water utilities connect to benefit community health, economy, infrastructure, and the environment.

The Vancouver example offers a model for utilities to integrate their services. By improving internal alignment, the City is better positioned to address critical challenges, prioritize projects, and identify viable funding sources.

HWEA

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ROOM **315**

CONTINUED PFAS TESTING ON BIOFORCETECH'S THERMAL PROCESSING SYSTEM

Valentino Villa
Bioforcetech

This presentation will take an audience through the details of our full scale operational system in Redwood City California that processes biosolids into PFAS free OurCarbon biochar. We will give an overview of PFAS testing to date, including new testing to be conducted in October '22 and published before this conference. The accumulation of microplastics, PFAS, PFOA, and PFOS in wastewater effluents puts our industry in a unique position to aid in the removal of these substances from our environment and population. Our team at Bioforcetech has taken the microplastics and PFAS issue as a personal challenge to overcome, and we are proud to share that third party, independent testing conducted on our technology shows considerable promise for its ability to successfully eliminate these harmful substances from input materials completely. In 2019, Bioforcetech initiated testing of our drying and pyrolysis process to determine our ability to eliminate CEC's from biosolids. To do this, Bioforcetech isolated a single large batch of biosolids and tested samples of this batch for PFAS, PFOA, and PFOS at each step of our drying and pyrolysis process. An initial sample was taken of anaerobically digested biosolids at 17% solids content, a second sample was taken of 91% solids content after the batch was dried in our patented Biodryer, and a third sample was taken after the batch was carbonized in our P-FIVE pyrolysis machine. The analysis of these three samples conducted by Vista Analytical Laboratory showed the reduction of 38 PFAS, PFOA, and PFOS compounds to below detectable levels after pyrolysis from a significant presence in both of the biosolids samples. In May of 2020, an EPA PFAS Task Force representative contacted Bioforcetech as part of a search for technology that could solve the PFAS crisis. We were happy to work with the EPA to further test our technology, and found the results promising again. The tests conducted on our biochar samples by the EPA Task Force in August of 2020 confirmed undetectable levels of 41 PFAS, PFOA, and PFOS compounds that the task force tested. The emissions stack was also tested using a new EPA method with positive initial results. The results of multiple tests conducted and confirmed to remove CEC's by different constituents shows great promise for the ability of our system to remove PFAS, PFOA, and PFOS from biosolids. While more rigorous testing must be completed, we are motivated and inspired by the results thus far.

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3:55 P.M. ROOM **316A** WED., FEB 8

CHEMICAL METERING PUMP, ACCESSORIES, AND SYSTEMS

Rich Hopkins
Blue-White Industries

Do you have any existing chemical feed system that causing you problems? Is your pipe breaking or have leaks? Are you getting inconsistent feeding of your chemical? How do you calculate the dosage of chemical? Should we using a diaphragm pump or peristaltic pump? How to determine the correct size pump? What are the best choices for a long-lasting, functional and cost effective system.

Pump accessories, what are they and how will they help? A detailed look at Back Pressure Valves,

Pressure Relief Valves, Pulsation Dampener, Inlet Stabilizer, Calibration Column, Pressure Gauge,

Metering Monitors and strainers.

This Power Point presentation will look at different chemical feed systems. We will have an

interactive discussion on existing systems. What is wrong with the system? What is correct with the system? What changes could be made to make the system better? This seminar will provide you that information.

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EXHIBIT HALL

HOW DESIGN IMPACTS HEADWORKS SCREENING SYSTEMS AND THEIR EFFECTS ON O&M

Dave Barkey
JWC Environmental

All wastewater treatment starts at the same place - the headworks. Headworks are responsible for a variety of pretreatment processes, including debris screening and removal. Proper debris screening is crucial to improving operational efficiencies, lowering energy and maintenance costs, and protecting downstream equipment - especially since that equipment is increasingly more sophisticated and sensitive to damage from smaller debris. Selecting the right screens is important for the optimal performance for the rest of the treatment system and operational bottom line.

A screen's purpose is to remove trash from the waste stream. Trash that is not removed quickly becomes problematic as it collects and clogs aerators, digesters, clarifiers, pumps, valves and mixers. Additionally, the effective removal of inorganic solids benefits treatment processes such as activated sludge, oxidation ditches, MBR systems, and lagoons. The result is reduced maintenance costs from not having to clean fouled equipment and lower treatment and energy costs as processes run more efficiently.

There are many types of screens from which to choose and it's important to understand their advantages and disadvantages to select the best screen for the headworks of a given treatment facility. This presentation will discuss the performance characteristics and design considerations for some of the most common screens in use at the headworks – bar screens, fine screens, band screens and drum screens.

Once an engineer knows the budget, footprint and maximum flow for the application, several key factors can be addressed in the design of a screening system: type of screen and screening media, hydraulic requirements, degree of protection, and control requirements. The presentation will provide insight into these considerations.

The presentation will finish with a discussion on maintenance strategies for a plant's screens. There is no one size fits all strategy. It's important to decide which maintenance strategy best fits the operation of the screens and the facility.

The design of a headworks screen is important as it impacts the entire treatment system and operational expense. Knowing the strengths and weaknesses of available screen technologies and the key design considerations will allow one to select the appropriate screens for their headworks and set-up downstream operations for their optimal performance.

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4:30 P.M. ROOM **311** WED., FEB 8

THE FIRST STEP TOWARDS CLEAN WATER - LIQUID ONLY SEWER

Bill Cagle, Stuart Coleman, and Michael Saunders
Orenco Systems, Inc. & WAI

The concept for Pressurized Liquid Only Sewer (LOS) was developed in Florida in the mid 1970's. At the time they were referred to as STEP systems. STEP is an acronym for Septic Tank Effluent Pump Systems. LOS has evolved from these early systems, into a more reliable, cost-effective, resilient, and sustainable option for providing wastewater collection. Today's LOS model affords low initial constructions costs, low O&M costs and substantial indirect cost savings for wastewater treatment.

LOS, as the name implies, retains solids and scum at the source and conveys only the water component of wastewater offsite for more advanced treatment and disposal or reuse. It is the only wastewater collection system that provides primary wastewater treatment at the source, before it is conveyed offsite. By providing primary wastewater treatment prior to conveyance, wastewater pumping becomes more efficient, pressurized collection mains become smaller and the need for large pump stations or lift stations is avoided.

Collection lines are small in diameter, and pressure mains are installed adjacent to the roadway and follow the existing topography. Lines can be installed by directional boring or in narrow trenches to minimize soil disturbance and/or damage to existing roads.

The onsite unit gets installed near the existing cesspool for easy connection to the existing building stub-out. Onsite units are connected to the collection mains with 1¼" diameter service lines. Just like water lines in Hawaii, a LOS service line can run above ground and even along walls if need arises.

General maintenance on the LOS system can most often be completed by a single technician with basic tools. Preventative maintenance visits are typically performed at intervals of 3 to 5 years and unplanned service calls average more than 10 years between events. Solids are removed from the tanks every 10 to 12 years by a septic hauler. The units have more than 200 gallons of emergency storage. Treatment can be provided at existing centralized plants or at smaller decentralized plants that are specifically designed to be complimentary to the LOS model.

LOS is ideally suited to facilitate more cost-effective and feasible options for clusters of homes that can vary from small clusters to large areas of more than 1000 properties.

Orenco is working with WAI to convert cesspools and set up more efficient, affordable decentralized solutions in local communities.

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RELIABILITY IS A CULTURE THING

Gerald Fejarang & Robert Donaldson
Kennedy Jenks Consulting & Collaborative Strategies, Inc.

Reliability is a methodology born out the airline industry in the 1950's and is the soul of asset reliability programs in other asset intensive industries. However, these other industries recognize that asset reliability goes beyond pumps, motors, valves and pipes – it's really centered around the human asset.

Typical questions I receive from our engineering colleagues are:

- "What is asset management?"
- "Would my asset management program work if I could just get my CMMS to work?"
- "What software should I use to make sound CIP decisions?"

For about 20 years the water and wastewater industry has adopted asset management principles as a way of managing its utilities. However, most of our utilities and agencies are still struggling with getting their respective programs off the ground, sustaining their programs, seeing results that were promised through an asset management program that improves system reliability and ultimately control the total cost of ownership. Asset management plans and yet putting plans into practice can be challenging. Problems and challenges with sustaining asset management are numerous and complex in nature: poor business processes, poor communication, not recognizing people value can derail an asset management program before the program goes through its first asset inspection.

Now that we have seen a generation of CIP centered asset management programs that brought very little change in culture. We must integrate a reliability culture to maximize the value of the workforce and induce community ownership. We do this by embracing the art of collaboration, listen to O&M, any make competency-based training a priority. Other asset intensive industries have practiced an asset management methodology that is centered on operations and maintenance to improve reliability by leveraging risk. Leveraging risk allows agents from other industries thoroughly leverage O&M knowledge to improve and maintain asset performance, allow engineers to track and improve system performance, and allows management to make reliable decisions to sustain business performance. This practice is not a new concept but has been practiced since for about 50 years – let's not re-invent the wheel but let's learn from these other industries that have put reliability on the map.

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ROOM **314**

INCREASING RESILIENCE OF CORAL REEFS IN OLOWALU, MAUI THROUGH EROSION CONTROL

Kim Falinski, Makale'a Dudoit Ane & Emily Fielding
The Nature Conservancy, Marine Community Manager & Maui Marine Program Director

The 939-acre Olowalu reef has been identified as one of the most essential reefs to protect on the island of Maui. Olowalu was declared an official Mission Blue Hope Spot in 2017 and research has shown that this large reef is an important source of larvae for other reefs in Maui Nui. Poor water quality is identified as a stressor to coral reef ecosystems at Olowalu, with sediment as the major contributor. Directly above the Olowalu reef is a low-lying coastal area that includes degraded wetlands and sand dunes. Further upland, wildland fires and pressure from Axis deer regularly denude the landscape.

State and Maui County landowners have plans for the next 20 years to improve the coastal and coastal-adjacent resources. The State Department of Transportation (DOT) plans to move the coastal highway inland. The State Division of Forestry and Wildlife (DOFAW) is proposing to build fencing to re-vegetate this area.

To inform the design parameters of best management practices and stormwater infrastructure design, we identified the highest loads of sediment and contaminants along the four-mile stretch of road using high resolution imagery and machine learning techniques to categorize bare and fire-affected areas into ranked sources of sediment, along with geochemical signatures to show connectivity. With the updated 0.3-m resolution vegetation and land use classification, along with a fine-scale elevation model, we were able to use hydrologic modeling to predict soil erosion hotspots.

We then considered where sediment is being stored in the existing floodplain through the ditch, culvert and retention basin systems using drone-based observations and in situ monitoring systems. We investigated whether maintenance protocols were sufficient to remove the hazard and considered how to retrofit existing sugarcane-era infrastructure for sediment retention using nature-based and culturally-appropriate solutions. For upland erosion, we developed a short list of management recommendations for implementation by partner agencies to design and implement erosion control protection measures. Our research showed sources and sink of sediment and contaminants to the Olowalu Reef Tract, and the proposed solution for storage of sediments using stormwater infrastructure and erosion control practices that are appropriate for a drought-prone future.

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ACHIEVING SECONDARY WASTEWATR TREATMENT STANDARDS USING ZERO-ENERGY COMBINED TREATMENT

Allison Blodig
Infiltrator Water Technologies

Combined treatment and dispersal technology (CTD) is a reliable, sustainable, non-electric, low-impact means of treating domestic wastewater to secondary standards and dispersing the treated water to the native soil within the CTD system footprint. CTD technology uses naturally occurring microflora and chemical processes to degrade wastewater organic matter, achieving NSF/ANSI 40 standards for carbonaceous 5-day biological oxygen demand (25 mg/l) and total suspended solids (30 mg/l). CTD technologies include a manufactured wastewater distribution device surrounded by sand conforming with ASTM C33 particle gradation specifications. Septic tank effluent enters the manufactured CTD device, where distribution and filtering occur, followed by additional microbial and chemical treatment in the surrounding ASTM C33-conforming sand, resulting in a treated effluent. CTD systems disperse the secondary-treated effluent directly to native soil through an open-bottom design, providing a tangible environmental benefit. CTD technology serves both single-family home and large-flow onsite wastewater treatment and dispersal challenges. This presentation focuses on passive, sand-based CTD technology systems; including what they are, how they function, and why they are increasingly becoming an important solution for wastewater management professionals, particularly with respect to difficult construction sites. The presentation includes an overview of several of the proprietary technologies in use that would be highly effective on difficult sites.

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ROOM **316A**

WASTEWATER BOC MEETING

No abstract

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EXHIBIT HALL

OPERATIONS AND MAINTENANCE CONSIDERATIONS FOR YOUR ODOR CONTROL SYSTEMS

Sean Trainor
Evoqua Water Technologies

The choice between chemical, biological and dry media (e.g. activated carbon) odor control systems for municipal wastewater conveyance and treatment facilities is largely a financial one. All three technologies can be effective, but the capital and operating costs can vary widely depending on the volume of air and concentration of odors being treated. O&M considerations also play an important role in appropriate technology selection as costs and level of effort to keep your odor control working correctly varies significantly for each technology. In some cases, combining a number of technologies in series is the correct solution to best manage your operations and maintenance costs.

Biological systems generally have the lowest operating cost, especially when treating higher odor concentrations, but their installed capital cost can be expensive when large air flow rates are required. Chemical scrubber systems are more expensive to operate, largely due to the cost of chemicals, but can be more efficient and robust, and will have lower installed cost when treating large air volumes. Activated carbon and other dry media systems can be cost effective treating low odor concentrations, but quickly become expensive if the media needs to be replaced too often. Therefore; a life cycle cost evaluation is needed to properly compare the relative cost of ownership of these odor control technologies, taking into account the installed capital cost, operating cost, and maintenance requirements for a range of air flow rates and odor concentrations.

Other important factors must also be considered, including level of operator input and maintenance hours required, available space, types of odorous compounds, fluctuating odor concentrations, intermittent operation, and uncertainties in the current and future design requirements.

Some general "rules of thumb" for odor control system design and selection are presented, as well as key considerations to keep in mind for each technology when maintaining your odor control equipment to ensure that you get the best performance out of your odor control equipment investment.