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 **54**

9:00 A.M. THU., FEB 9

ROOM **311**

REPLACEMENT OF SY-001 WASTEWATER PUMP STATION, JBPHH

Ayako Kawabata and Ryan Kikuchi
HDR

The original SY-001 Wastewater Pump Station (WWPS) constructed in 1971 experienced accelerated deterioration due to harsh environmental operating conditions. The Navy's largest and most important pump station is critical to the Joint Base Pearl Harbor-Hickam (JBPHH) operations as it receives wastewater collected from over 50 miles of sewers and 25 upstream pump stations. Catastrophic failure of the WWPS would result in sewer overflows impacting the water quality of historic Pearl Harbor and significant public health hazards. The collapse of a WWPS manhole from deteriorated concrete validated the urgent need for the replacement WWPS.

Construction of a new WWPS at the existing site was successfully completed under Military Construction (MCON) Project P-704 in 2021. The project was designed in just over a year and construction was completed in 2.3 years. The new $67.1 million three-story pump station has a 24 million gallons per day (mgd) peak capacity and is among the largest in the state.

Through competent planning, design and construction services, the project met stringent time and budget constraints. The new WWPS was constructed on the 2-acre site that required extensive demolition work, utility rerouting, and contending with soil contamination while keeping the existing WWPS in full operation.

A new, state-of-the-art horizontal dry-pit submersible pump model was employed to meet challenging variable operating requirements. The large pumps showcased two first-of-their-kind features for easy access to internal pump components: (1) quick access pivoting service inlet, and (2) hydraulically operated service sled. The innovative access feature compliments the proven non-clogging pump impeller that significantly reduces clogging and downtime. Pump clogging is a major global problem due to the increased use of "flushable" wipes during the pandemic.

The project used an improved compact self-cleaning wetwell design to optimize pump inlet conditions. The wetwell and pump inlet design was reviewed using computational fluid dynamics tools.

The Navy and the design and construction team members collaborated and worked cooperatively throughout the project. Despite the aggressive schedule, change orders amounted to just 3.2 percent above the original $65.0 million contract award amount and benefited all stakeholders by improving the quality of the facility and reducing construction time.

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PRESENTATION **55**

9:00 A.M.

ROOM **312**

THU., FEB 9

FUNDING OPPORTUNITIES FOR WATER AND WASTEWATER INFRASTRUCTURE THROUGH SRF/BIL

Joan Corrigan, Sina Pruder
Department of Health

In November 2021, Bipartisan Infrastructure Law (BIL) was passed, dedicating $50 billion to improving our nation's aging water systems over a 5-year period. In that time, up to $646 million in federal funding will be funneled to Hawaii through the State Revolving Fund (SRF) programs. This presentation will discuss the current state of Hawaii's SRF and how our state drinking water and wastewater systems can take advantage of this incredible funding opportunity.

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PRESENTATION **56**

9:00 A.M. THU., FEB 9

ROOM **314**

BUILDING CLIMATE-RESILIENT TRANSPORTATION NETWORK IN VULNERABLE COMMUNITIES

Rosey Jencks, Los Angeles Department of Public Works
Ana Tabuena, Brown and Caldwell

Like many cities around the globe facing the deepening threats of climate change and increasing economic inequality, Los Angeles is seeking opportunities to increase its resilience to climate change and to confer more benefits with each public dollar spent.

All too frequently, when the public sector teams look to deliver multi-benefit projects, they face the enormous task of working across agency silos facing differing goals, funding rules and capital delivery process. This misalignment often spells the end of integrated and multi-benefit projects. To address this challenge, StreetsLA, an integrated team charged with the planning, design and delivery and maintenance of the City of Los Angeles' (City) street network and urban forest has initiated a new planning approach to stich up the multiple agencies that work in the street network to accelerate integrated grey/blue/green infrastructure improvements to deliver climate resilient, multi-benefit street projects. Their goal is to accelerate the implementation of street corridors that promote walking, biking, and transit with stormwater, flood resilience and water quality compliance with urban cooling using trees and landscape, and promoting biodiversity, and wildlife corridors and prioritize vulnerable communities.

The team will work with cross-agency and community stakeholders to identify cross agency capital project planning goals and to create a methodology that the City can use to identify multi-agency funding and planning goals and identify which are the most competitive for the various funding sources. The proposed framework is an assessment process to integrate multi-mobility, stormwater quality, and greening. The tool will align multi-benefit project concepts with various established funding sources and produce grant-ready and competitive project concepts while allowing agencies to suit the priorities of its grant sources. The goal of this initiative is to facilitate One Infrastructure, multi-benefit, street transformations. The team will pilot the process to select and design a model corridor that can pave a path for the rest of the City. The team will identify and plan a demonstration corridor that will confer all the benefits of this integrated approach. The approach will be used to align and stitch together seemingly disparate efforts into a one-infrastructure approach that will uplift vulnerable communities, promote good government practices, and demonstrate world class, multi-benefit design.

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PRESENTATION **57**

9:00 A.M. THU., FEB 9

ROOM **315**

SOLVING INFILTRATION AND CORROSION PROBLEMS IN SANITARY SEWER STRUCTURES

Jim Swain
CIP Construction Technologies, Inc.

Solving Infiltration and Corrosion Problems in Sanitary Sewer Structures

Problem: Infiltration & Inflow (I & I)

Inflow is water running into manholes around the lid during rain events and snow melt. Tight fitting lids, plugs in the lid hook holes and "dog dishes" (bowls that hang directly under the lid to catch water) can help solve this problem.

Infiltration is water traveling into sewer pipe, manholes and lift stations within the bodies of these structures, usually in the section joints and around the pipe penetrations in concrete structures and in the mortar joints of brick structures.

This unnecessary water travels downstream in the system to the wastewater treatment plant or sewage lagoon and must, of course, be treated. The smaller the collection system the greater the cost per gallon. But whether you have a small or large system significant infiltration can be very costly.

The solutions for eliminating infiltration can easily be economically justified by reducing gallons per day treated. Also, wastewater plants and lagoons need not be "over-engineered" -- at huge expense -- if ground and rain water are not being treated.

Solutions:

1) New construction - often the most expensive choice

2) Chemical grout - this is the simplest method for eliminating minor infiltration. It can solve major infiltration problems but can get quite expensive and involve a lot time because "chasing" infiltration can be very tedious and frustrating. Many times it ends up being a band-aid approach if the infiltration ends up working its way to another entry point in the structure.

3) Cured-in-place liners can oftentimes be the most practical solution both cost-wise and length of installation time and is almost always the most permanent method. They stop infiltration and provide structural integrity.

CIPP (cured-in-place pipe) liners are usually made of felt or fiberglass and resin.

CIPM (cured-in-place manhole) liners are made of fiberglass, felt, PVC and resin.

The Triplex liner system is unique in that it sandwiches a felt/PVC inner membrane between multiple layers of fiberglass and it has been patented. The inner membrane is the key to stopping infiltration. It is the seal. This seal is protected by the fiberglass layers and is the most effective way to permanently eliminate infiltration in manholes, lift stations, vaults and culverts. In severely leaking structures the associated installation costs are often recovered within a few years or so

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PRESENTATION **58**

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ROOM **316A**

VARIABLE FREQUENCY DRIVE FUNDAMENTALS AND HOW THEY CAN REDUCE ENERGY DEMAND

Doug Ryan
Danfoss Drives

The purpose of our 30 minute presentation is to reaffirm the benefits of using a variable frequency drive (VFD) in water and wastewater process plants and conveyance/distribution systems.

Areas of emphasis will include:

A. Affinity laws for pumps and impact of reduced speed on HP consumed with why a reduction of speed is warranted in many cases.

B. Energy savings attained by VFD use and identify other potential savings.

C. Common applications for VFD's.

D. Impacts towards CO2 reduction.

E. Q&A time.

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PRESENTATION **59**

9:00 A.M. THU., FEB 9

EXHIBIT HALL

DIGITAL FLOW: EMERGING TECH FOR ACCURATE MEASUREMENT IN TOUGH APPLICATIONS

Chris Helliwell and Jeff Taggart
Endress+Hauser / Rust Automation & Controls

In our industry, the conveyance of water is unavoidable. Whether you are the supplier or consumer, the accurate measurement of that water is crucial to maintaining a trusted relationship. Our livelihood and well-being is literally dependent on ensuring the correct volume of water is accounted for. Measuring flow volume can be achieved in a variety of ways, with new digital flow meters becoming the new norm and best practice. But not without limitations; subject to installation and application condition requirements. This all is about to change.

While taking a quick look at the history and other technologies used for measurement, we will focus on electromagnetic technology. A Mag Meter is a powerful, digital instrument used to measure an array of parameters. Outlasting and out-performing devices that rely on analog means of volume flow rate calculations.

To date, all magnetic flow meters required specific installation conditions such as straight pipe both upstream and downstream of the meter to provide the best accuracy. Recent innovations have allowed for these meters to be installed in the worst application environments, such as zero straight run of pipe - or where the flow in a pipe is interrupted by nominal diameter changes, insertion devices, etc. These enhancements and features allow for a stronger business case when considering upgrading an existing system or designing a new one. Being that these meters are digital devices, on-board diagnostics and troubleshooting are ever present. Allowing for easier and trouble-free operation. Giving maintenance personnel peace of mind knowing that the tools implemented will not fail and provide the accuracy they desire.

Both Water and Wastewater industries benefit from a strong infrastructure of reliable measuring tools. If accounting for every drop of water is your goal, you will find value from this education session.

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PRESENTATION **60**

9:35 A.M.

THU., FEB 9

ROOM **311**

THERMAL HYDROLYSIS PRETREATMENT AND ANAEROBIC DIGESTION TO PRODUCE RENEWAL NATURAL GAS

Michael McWhirter, Samantha Babbitt, Bryce Swillum
Stantec Consulting Services

Many facilities across the United States are implementing thermal hydrolysis pretreatment (THP) and anaerobic digestion (AD) as a means to reduce biosolids mass and to create a Class A Exceptional Quality Biosolid. The use of THP allows effective digestion of not only primary sludge but also secondary sludge and allows significant intensification of the digestion process with corresponding major reductions in project capital cost. The Anaerobic Digestion also creates biogas, a source of green energy which currently has a very lucrative market which various wastewater facilities are taking advantage of.

Two examples of these facilities are Louisville MSD's Morris Forman Water Quality Treatment Center (MFWQTC) in Louisville, KY and the Washington Suburban Sanitary Commission's Piscataway Water Resource Recovery Facility (PWRRF) in Accokeek Maryland. Both these facilities are currently undergoing major Biosolids to Energy projects to implement THP and to create Renewable Natural Gas (RNG) with the aims of reducing issues with biosolids disposal issues and create revenue streams for their owners. Both sites will act as regional facilities serving the entire service area for the utilities. The Morris Forman facility is at 60% design and will treat 180 dtpd during maximum months and Piscataway facility is near the end of construction and will process 90 dtpd once commissioned.

This presentation will explain the treatment process being implemented at each using the two different sites to compare and contrast aspects of the projects and share lessons learned related to issues such as coordination of design with ultimate disposal, approaches to maximum gas production, evaluation of whether to use the biogas for RNG or for combined heat and power (CHP), integration of existing facilities, dewatering approaches, side stream treatment, odor control, energy efficiency related to cooling of thermally hydrolyzed sludge, gas treatment standards required and utility coordination. The presentation will also include an explanation of the current markets for RNG and what a utility needs to do to take advantage of those markets.

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PRESENTATION **61**

9:35 A.M. THU., FEB 9

ROOM **312**

HONOLULU BOARD OF WATER SUPPLY EXPERIENCES IMPLEMENTING THE LEAD AND COPPER RULE REVISIONS

Erwin Kawata
Honolulu Board of Water Supply

The Lead and Copper Rule Revisions (LCRR) will require water utilities to prepare an inventory and identify the material type of all service lines on the public-side and private-side of the water meter and make it available to the public. Tap water locations selected for testing will need to align with the results of the inventory, new sampling tiers and collect five 1-liter samples at each site. Utilities will also need to conduct tap water testing in schools and day -care facilities and those with lead service lines (LSLs) must prepare and implement an LSL replacement plan.

This presentation will examine the Honolulu Board of Water Supply (BWS) experience with preparing its service line inventory and identifying the materials of its more than 170,000 service connections. The results of the inventory, the challenges encountered including the tap water locations selected based on the survey, preliminary test results and lessons learned will be discussed.

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9:35 A.M.

ROOM **314**

THU., FEB 9

SEA LEVEL RISE, STORM SURGE AND TSUNAMIS! CLIMATE CHANGE EVALUATION FOR HONOLULU

Cari Ishida, Rachel Duncan, Sarah Deslauriers, Roger Babcock
Carollo Engineers, Inc. & City and County of Honolulu

The purpose of the Climate Change Vulnerability Assessment and Resilience Plan portion of the City and County of Honolulu (City) Sand Island Wastewater Treatment Plan and Sewer Basin Facilities Plan (Fac Plan) was to assess the threats posed to facilities by flooding threats and climate change impacts and to recommend adaptive management strategies to address these threats. Assessed threats include coastal erosion, tsunamis, storm surge (related to hurricanes), 100-year flood events, and three different sea level rise (SLR) scenarios. The analysis focused on the Sand Island WWTP and 17 wastewater pump stations (WWPSs) within the Sand Island Sewer Basin.

This assessment included scenarios through the year 2100 that were identified as part of the City's Climate Change Commission Sea Level Rise Guidance to inform the selection of adaptive management strategies that will be protective of the City's wastewater facilities, operations, and accessibility to sites. These strategies will be considered alongside other project drivers, such as aging infrastructure and capacity needs for the overall capital improvement plan.

This presentation will summarize the methodologies and results of the climate change impact assessment performed for the Fac Plan and discuss the next steps.

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9:35 A.M. THU., FEB 9

ROOM **315**

SUCKING THE AIR OUT OF THE PARTY: A NOVEL APPROACH TO PHOSPHORUS SEQUESTRATION

Merima Beganovic, Hao Pham
Ovivo Water

Wastewater treatment plants with anaerobic digestion benefit from the sludge stabilization step, which, combined with additional treatment, can offer various avenues for energy recovery. With benefits, however, come unintentional consequences. Anaerobic digestion negatively impacts the facility's operational demands by releasing nutrients from the sludge, including phosphates. Even worse, plants that employ more intensive digestion methods such as thermal hydrolysis will see much greater increase in ammonia and phosphate. High concentrations of nutrients pose many challenges, such as nuisance struvite formation leading to operational disruptions and greater difficulty in meeting regulatory compliance of the effluent discharge limits.

The patented process, EloVac-P, demonstrated its ability to provide a cost-effective solution to all these challenges through a year-long full- scale pilot at the Provo Wastewater Treatment Plant (WWTP) in Provo, Utah. Unlike the conventional method of using air injection to strip CO2 and raise the pH in the digestate, as an innovation in the industry, EloVac-P uses vacuum degassing to increase pH in the reactor to promote struvite precipitation, with an efficiency of 90%. Provo WWTP saw issues with struvite formation post anaerobic digestion in piping, pumps and dewatering equipment, causing operational interruptions, leading to down-times. The plant had recently received a new nutrient permit with an upgrade expected to exacerbate the phosphorous load into the digestate stream, subsequently making struvite formation and dewatering bigger challenges. A consideration for digestate based phosphorous sequestration technologies was made and, after bench- scale testing, the EloVac-P process was chosen for pilot testing.

A small footprint of 13'x 4'x 8' for the 21MGD system also worked in Provo's advantage as space is a valuable commodity on site. Within a week of start-up, the plant site saw noticeable reduction in phosphate in the digestate and resulting centrate. The staff also noted better dewatering performance downstream. Effluent Phosphate levels consistently remained below the mandated 30 mg/l both in the EloVac-P system effluent as well as the centrate, indicating controlled struvite precipitation was occurring in the reactor. Additionally, no further struvite formation was seen in all previously prevalent locations, showing a successful implementation of this novel, nutrient removal technology.

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ROOM **316A**

UNDERSTANDING SYSTEM HEAD CURVES TO PUMP UP YOUR PUMP SIZING SKILLS

Michael Kelley, Glen Lindbo
Zoeller Company

This presentation provides a deeper dive into pump sizing with a focus on the system head curve. A design point, though critical in selecting a pump, is only one piece of the puzzle. To fully understand the relationship between flow and pressure in a system, and how a pump interacts with that system, additional information is needed. The system head curve gives the full picture that a single design point fails to and provides additional information to select the best equipment for each application.

The "system" in system head curves is defined as the pipe, number and type of valves, static head, and any other aspects of the design that may affect the pressure on the pump. The system head curve is a graphical representation of how the pressure changes as flow changes through the system. In a sense, the system head curve is the performance curve of the piping network.

This presentation will address some of the benefits the system head curve can provide such as determining operating points, analyzing simultaneous operation, piping design, VFDs, varying design conditions and comparison of conservative and expected performance.

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9:35 A.M. THU., FEB 9

EXHIBIT HALL

PRESSURE SEWER SYSTEMS - DECEPTIVELY SIMPLE, ENGINEERED FOR RELIABILITY

Derek Lachut
Environmental One Corp

Pressure sewer systems have long been recognized as the desired solution for providing wastewater collection and conveyance for communities that have typically been hard to service. The system consists of a network of pressure pipes and grinder pumps installed at each residence of business. The grinder pump station collects the wastewater, grinds the solids to small particles, and conveys it to a larger sewer main or directly to a wastewater treatment plant.

After the commercialization of the first residential grinder pump station in 1969 and the growing acceptance of pressure sewers in the years after, the market became relatively full of seemingly equivalent grinder pump stations from a variety of manufacturers. The availability of several options helped to spread awareness of the pressure sewer concept and spread different approaches to the design of the grinder pump station itself. Over the past 50 years, pressure sewer systems and the designs of the grinder pump station have evolved. What, on the surface, is typically a small horsepower grinder pump in a tank, is now often viewed as a household appliance and, hence, should be free of preventive maintenance, simple to install, and reliable.

Misconception of pressure sewer systems can create apprehension for communities considering an appropriate solution for their wastewater collection. Municipal and utility administrators, engineers, and operators may be apprehensive to properly evaluate pressure sewers due to unfamiliarity with the design, operation, and maintenance efforts when considered against the more familiar gravity sewer systems. This apprehension can result in unbalanced assessments.

With an ever-growing landscape of products, materials, technology, and quality of grinder pump stations, decision makers may be overwhelmed with what choices are best for their situation and stakeholders. This Demonstration Track will review the key components of a grinder pump station. Within each of these components, a detailed review of the most appropriate materials and available design elements will be presented. This review will detail how various options and features contribute to a system's ease of installation, performance, reliability, and ease of serviceability. Additionally, the discussions will include valuable information to support the consideration of the proper grinder pump design and inclusion of system monitoring to reduce operation and maintenance considerations and costs.

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10:50 A.M. THU., FEB 9

ROOM **311**

FLYWHEEL UPS SYSTEMS - A UNIQUE SURGE MITIGATION OPTION AT THE PEARL CITY WASTE WATER PUMP STATION

Garrett Leong, Bill Koch, Emily Dong
Brown and Caldwell

The Pearl City Wastewater Pump Station (WWPS) was rehabilitated with new horizontal dry-pit submersible pumps. These pumps are highly efficient, are able to pass rags effectively, and have state-of-the art maintenance features. However, submersible pumps are also characterized by lower rotational inertia than the vertical centrifugal pumps that were replaced at the WWPS. A surge analysis indicated the need for enhanced surge mitigation measures. Various surge mitigation measures were evaluated, however, traditional surge mitigation measures typically used for wastewater pump stations were determined to be infeasible or were not cost effective.

Therefore, in coordination with the City and County of Honolulu (City), a Flywheel Uninterruptible Power Supply (UPS) system was evaluated as a surge mitigation measure. According to Flywheel UPS and pump manufacturers that were consulted, a Flywheel UPS system had not been implemented at a wastewater pump station for surge mitigation, despite historically reliable application with medical facilities, data security centers, and sensitive industrial/ process equipment. Flywheel UPS technology relies on a spinning mass, or flywheel, on a low friction bearing in near-vacuum conditions. Energy capacity is derived from the inertia and speed of the flywheel. Upon a power failure, the flywheel, which stores kinetic energy, will supply sufficient power to allow the pump to continue to run until the standby generator system starts, or if the standby generator power is not supplied quickly, will allow the VFD to safely ramp down the pump such that dangerous surge pressures are not generated.

This presentation summarizes this unique design and implementation of a Flywheel UPS system at the Pearl City WWPS, offering a viable option for surge mitigation at wastewater pump stations.

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ROOM **312**

LEAD AND COPPER RULE: MAPPING LEAD SERVICE LINES WITH GEOGRAPHIC INFORMATION SYSTEMS

Christa Campbell and Suzanne Timani
Environmental Systems Research Institute, Inc. (ESRI)

The Lead and Copper Rule Revision includes an update that requires water systems to identify and make public the locations of lead service lines. Identifying and replacing lead service lines is a lot of work as well as a significant expense. GIS based applications support field data collection, location of lead service lines, visualizing and analyzing data, and creating easy-to-use resources for the public.

The task to complete a service line inventory for both the private side and public side is challenging for many utilities. This presentation will include a summary of what is required to meet the lead and copper rule revision requirement to perform a service line material inventory and share the results. We will focus on how GIS based applications can be used to collect data in the field and share this data with internal and external stakeholders.

We will demonstrate data collection and visualization as well as share Case studies that show how utilities are using GIS to collect lead service line information, showing it on a map, and sharing it with the public.

Resources will be shared at the end of the presentation to provide attendees with additional information.

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ROOM **314**

AWWA STORMWATER MANAGEMENT STANDARD: A TOOL TO SUPPORT UTILITY OPERATIONS

Chi Ho Sham
Past American Water Works Association President, ERG

Water utilities strive to have a well-run water system that protects public health. With the ever-increasing complexity of water resources management and environmental protection issues, water utilities must tackle various challenges in the management and operation of their source water and infrastructure. As stormwater becomes more important for water professionals to understand and manage, in 2016, American Water Works Association (AWWA)'s Standards Council authorized the development of a new Utility Management Standard or G-series Standard, namely Stormwater Management for Water Utility. A committee was formed and has been working on the standard. The standard has recently been completed and approved by the Board of Directors of AWWA.

This first edition of Stormwater Management Standard targets drinking water utilities and addresses the following issues: water quality, water quantity, design, operation and maintenance, emergency preparedness and response, and public outreach and communication. Because AWWA standards must undergo review and affirmation every five years per American National Standard Institute (ANSI) requirements, additional target audiences will be included in future editions of this standard. The purpose of this paper is to present the development process of AWWA Standards and the content of the new Stormwater Management Standard and open discussions with conference participants regarding effective mechanisms to implement the Stormwater Management Standard for self-assessment, counsel, and assistance at the water utility level and beyond.

PRESENTATION **69**

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ROOM **315**

OPEN FORUM WITH WORLD ECONOMIC FORUM PRESIDENT, IFETAYO VENNER

Ifetayo Venner
Arcadis

No abstract

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ROOM **316A**

EVERYTHING YOU WANTED TO KNOW ABOUT AIR VALVES

Kim Sorensen
Aquestia USA

Do I need an air valve? What do air valves really do for our pipelines? Should I use an air release valve, an air/vac valve or a combination valve? Where should they be placed? I only need them at high points, right? What size do I need, 2 inch should be fine, right?

There always seems to be a lot of questions regarding air valves. This presentation discusses the different types of air valves, why we need them, where to place them and how to size them based on location. The AWWA M51 air valve sizing and placement guidelines will be discussed and how these apply to our pipe systems. System issues that can impact air valve functions such as low pressure, partial pipe flow and constant filling/draining of wastewater lines. The difference between air valves for clean water systems and air valves for wastewater systems will be presented as well as items to consider regarding air valve maintenance.

ARI USA is recognized as the worldwide leader in the engineering, design, manufacture, and application of air valves for the water and wastewater industry. One of A.R.I.'s unique advantages is that we focus exclusively on the effects of air in pipelines to present opportunities for reduction in power costs, reduction in maintenance costs and reducing other negative impacts that are caused by air in pressurized piping systems.

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EXHIBIT HALL

CASE STUDIES FOR AEROBIC GRANULAR SLUDGE IN NORTH AMERICA

Brent Quimby
Aqua-Aerobic Systems, Inc.

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

The AGS process has been implemented successfully for the past 17 years with over 90 plants either in operation or under construction globally. Introduced to the North American market in 2017, there are now over ten plants operating or under construction in the United States. Since 2020, new AGS plants have been started up in Foley, AL, Idaho Springs, CO, Whitefish, MT, and Wolcott, KS. Several other plants are currently under construction or starting up, including on outside the Kahului Airport on Maui. This sessio will examine several of these plants, including the circumstances that led them to adopt AGS technology, and the performance of the operating plants since startup. It will also include a general summary of AGS, its operating principles, and a history of its development and implementation in North America and worldwide.

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11:25 A.M. THU., FEB 9

ROOM **311**

SAND ISLAND WWTP SECONDARY TREATMENT PHASE 1 UPDATE

Jordan Fahmie, Gianne Constantino, Kekoa Tam
AECOM , The Limitiaco Consulting Group, Yogi Kwong Engineers

The Sand Island Wastewater Treatment Plant (WWTP) is the largest WWTP in Hawaii, and is currently undergoing significant improvements to accommodate secondary treatment, operations & maintenance, and resilience improvements. This presentation will include a progress update and feature points of interest from the first year of construction (primarily civil, geotechnical, and structural work). The completed project will feature an Intermediate Pump Station, 20 mgd average daily flow MBR secondary treatment system, sludge thickening facility, utility tunnel, maintenance building, effluent connection to the existing UV disinfection facility, and more.

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ROOM **312**

CONSIDERATIONS FROM HAWAII'S LEAD TESTING PROGRAM FOR THE LEAD & COPPER RULE IMPROVEMENTS

Sam Becker & Ayako Tischler
TruePani, Inc.

The Hawaii State Department of Health (HDOH) and Safe Drinking Water Branch (SDWB) have conducted a multi-year project to collect and analyze over 10,000 drinking water samples for lead at all public elementary and eligible child care facilities across the state. The program is funded through the EPA Water Infrastructure Improvements of the Nation (WIIN) Act grant that assist states voluntary testing for lead contamination in drinking water.

TruePani Inc. served as a contractor to HDOH, managing the program, coordinating with the Departments of Health and Human Services, and Education, and completing sampling. The two-year project was completed in September 2022, making the State of Hawaii one of the first in the nation to complete such a project at all public elementary schools.

Ongoing state-wide school and child care sampling programs create a foundation for communication and awareness of lead in drinking water sampling at schools and child care programs. Ultimately, this can be helpful for water systems completing similar activities due to the Lead and Copper Rule Revisions (and ultimately the Lead and Copper Rule Improvements).

In this presentation, TruePani will provide an overview of the design, data, and takeaways from the Hawaii project and connect this work to the forthcoming Lead and Copper Rule Improvements. The purpose of this presentation is to discuss best practices and lessons learned. TruePani's experience in implementing sampling programs, coupled with successful outreach campaigns to drive enrollment in these programs, will inform the approaches shared in this presentation.

If selected, the presenter(s) will provide a framework for water systems to understand the school and child care sampling requirements of the LCRR and how existing data from a state sampling program may be used for compliance.

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PRESENTATION **74**

11:25 A.M. THU., FEB 9

ROOM **314**

STORMWATER CAPTURE, TREATMENT, AND REUSE AT VINCENT LUGO PARK

Jeff Herr
Brown and Caldwell

One approach to managing stormwater is infiltrating stormwater into the subsurface to prevent flooding and reduce surface water quality impacts. Drainage wells that infiltrate stormwater below ground and are deeper than they are wide are considered Class V underground injection. In Hawaii, UICs are regulated and permitted by the Hawaii Department of Health under the Safe Drinking Water Act (SDWA). While drainage wells are effective at decreasing runoff of stormwater to surface water, there can be an associated impact on groundwater.

The 2020 decision by the Supreme Court of the United States (SCOTUS) regarding Hawaii Wildlife Fund et al. vs. County of Maui has implications for stormwater management and infiltration. Discharging stormwater to groundwater which may subsequently discharge to a Water of the United States (WOTUS) may constitute the "functional equivalent of a direct discharge to WOTUS". The SCOTUS decision makes functional equivalent discharges subject to Clean Water Act regulation in addition to the SDWA. As a result, pollutant-carrying stormwater drainage wells could require a National Pollutant Discharge Elimination System (NPDES) permit in addition to an Underground Injection Control (UIC) Class V well permit.

With this potential permitting backdrop, Hawaii can begin to envision a regulatory framework to address indirect discharges of stormwater to WOTUS. Engaging the affected stakeholder community (regulators, regulatees, scientists, engineers, advocacy organizations) in developing a prototype framework could yield significant benefits in acceptance and compliance.

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PRESENTATION **75**

11:25 A.M. ROOM **315** THU., FEB 9

SEVEN BIGGEST MISTAKES ON SEWER BYPASS

Paul Leonard
Pacific Pump & Power

#1. Wrong pumps:
A. Size for the wrong flow
B. Size for the suction lift
C. Size for the wrong TDH
D. Priming System
E. Downstream of a chopper pump!

#2. piping selection.
A. Material choice.
B. Proper testing.
C. Secure fittings.
D. Suction screens vs inline screens vs no screens
E. Check Valve placement
F. Redundancy in piping

#3. Spill Manhole Elevation
A. What is it?
B. Where is it?
C. How much capacity in the system? And how long do you have before things start to spill?

#4. Backup pumps
A. Pump sizing
B. Automation
C. Backup vs Lag
D. Equipment Battery

#5. Bypass Monitoring
A. Pump Watch
B. Auto-dialer

#6. Air Release Valves
A. When to have them
B. Where to vent them
C. What can go wrong

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PRESENTATION **76**

11:25 A.M. THU., FEB 9

ROOM **316A**

AUTOMATION & SCADA COMMUNICATION IN THE AGE OF INDUSTRIAL INTERNET OF THINGS

Alan Hudson
VTScada Software

Over the last 35 years, typical water wastewater SCADA systems have exploded in the quantity of data expected to be gathered from an ever-increasing number of digital field devices. The communication "pipelines" used to connect these devices now include a multitude of serial, Ethernet, radio, and cellular communication mediums via a plethora of communication protocols and methods.

What used to be simple has now become complex. Or is it just the opposite - What used to be complex has now become simple?

In 2013, the IoT (Internet of Things) was defined as "the infrastructure of the information society." For us, the IIoT (Industrial IoT) emerged. Many in our industry have rightly argued that "we have always had an IIoT" because of our documented standards, mechanisms, and best practices for how to gather information from the field devices, store the data centrally, analyze and make decisions accurately, and command and control the field devices through this recursive process. Today's IIoT "buzz" takes advantage of the expanding IoT technologies and connectivity, yielding many more possibilities.

Utility-wide SCADA system successes have created a hunger for data, a desire for standardization, and a realistic concern about security. And while emerging technologies seem to be helping drive the vision, we must continue to place a proper importance and a

balanced perspective on proven technologies and best practices. We must remember the goals of our industry – "to reliably and

efficiently provide safe drinking water to the public and remove, clean, and restore the waste water through environmentally responsible methods."

This presentation explores the proven communication protocols used in today's SCADA systems and how they compare, contrast, and complement emerging IIoT functionalities.

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11:25 A.M. THU., FEB 9

EXHIBIT HALL

NEWGENERATOR RESOURCE RECOVERY MACHINE FOR OFF-GRID WASTEWATER TREATMENT AND REUSE

Daniel Yeh, Robert Bair, Hsiang-Yang (Gary) Shyu, Ben Hoque
University of South Florida

Billions of people worldwide, many in marginalized communities, suffer from poor sanitation stemming from lack of wastewater infrastructure. Due to high CAPEX and OPEX, the conventional approach of centralized wastewater treatment plants served by an extensive sewer system is not an option for many communities. Accordingly, a new classification of modular and pre-fabricated non-sewered sanitation systems (NSSS) have been proposed as a micro-infrastructure alternative. Developed at the University of South Florida (USA) through the Bill and Melinda Gates Foundation's Reinvent the Toilet Challenge (RTTC), the NEWgenerator is a solar-powered, modular, automated, wastewater treatment and recycling system capable of operating completely off-grid from energy, water and sewer. The NEWgenerator is designed to recover nutrient fertilizer, clean water, and renewable energy from wastewater and organic wastes. The core technology stages within the NEWgenerator are the anaerobic membrane bioreactor (AnMBR) (for solids, COD and pathogen removal), nutrient capture bed (for N and P removal/recovery), and electrochlorination (for pathogen removal and polishing). The NEWgenerator is capable of handling a wide range of wastewater strengths (black, yellow, grey), intermittent flows, and prolonged shutdowns/dormancies.

This presentation will follow the two-decade journey of the NEWgenerator from concept to development to commercialization, including multi-year field trials in India (school in Kerala) and South Africa (informal settlement community in KwaZulu-Natal) with the NEWgen 100, which is capable of providing service to hundreds of users per day. The NEWgenerator is the recipient of the 2014 Cade Museum Prize for Innovation and the 2020 USPTO Patents for Humanity Award. Capable of operating for years entirely on solar energy, the NEWgenerator can establish a closed-loop, climate resilient, decarbonized, circular-economical micro-infrastructure in resource-constrained environments, with service from single households to a cluster of homes and businesses. In particular, because the NEWgenerator can generate high quality effluent meeting water reuse or surface discharge requirements, the technology has a distinct value proposition for onsite wastewater treatment in locations with poor soil drainage conditions, such as Lowndes County, Alabama and the Hawaiian Islands. The presentation will describe potential future applications in islands to help end cesspools in Hawaii.

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PRESENTATION **78**

1:30 P.M. THU., FEB 9

ROOM **311**

WASTEWATER CAPACITY MANAGEMENT USING FLOW MONITORING AND HYDRAULIC MODELING

Lisa Kimura and Stan Kowalczyk
City & County of Honolulu / Brown and Caldwell

The City and County of Honolulu's (City's) wastewater system serves approximately 780,000 people, in addition to various commercial and industrial facilities throughout Oahu, Hawaii. The City initiated an island-wide flow measurement and modeling program to achieve their vision of proactively managing and mitigating sanitary sewer overflows (SSOs) and making informed decisions to plan for future developments. The overall goal of this program is to more accurately quantify long-term wastewater flow trends in the wastewater collection system—consisting of 51,000 pipes, 50,000 manholes, and more than 70 pumping stations—and further refine and improve the tools that will enable the City to resolve current capacity limitations and proactively plan for future growth in a dense urban environment. To achieve this vision, the City partnered with Brown and Caldwell and have completed seven years of capacity management services to date.

This program consists of three main components:

Continuous Flow and Rainfall Data Collection. Data is collected daily across the island of Oahu's wastewater collection system from 41 rain gauge sites and 73 wastewater flow metering locations spread throughout all 9 of the City's wastewater basins. The flow meters and rain gauges are equipped with wireless communication capabilities to provide the City with access to sewer flow and rainfall data.

Hydraulic Model Update and Calibration. The collected rainfall and flow data is used to regularly update and calibrate an island-wide hydraulic model using the InfoWorks ICM modeling software. The sewer network in the hydraulic model is regularly updated using geographic information systems (GIS) data that is maintained by the City to reflect current sewer infrastructure. After the model network is updated, tools and processes developed by the project team are used to calibrate dry and wet weather flows efficiently and accurately in the model using rainfall and flow data collected throughout 8 of the 9 wastewater basins. Flow and rainfall data is currently being collected to develop a hydraulic model for the Laie Basin, which is primarily a low pressure sewer system and the only basin for which a hydraulic model has not yet been developed.

Application of Hydraulic Model for Capacity Management and Planning. The calibrated hydraulic model is used to identify hydraulic deficiencies in the system such as a spill or overflow point, and where infrastructure needs to be upgraded based on existing or future conditions. Processes have been developed to use the model to conduct long- range planning and identify where infrastructure needs to be upgraded based on areas of projected rapid growth.

The model is also used to support basis-of-design and alternatives analysis for current capital improvement projects and evaluate the impacts to the wastewater system from proposed large developments.

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1:30 P.M. THU., FEB 9

ROOM **312**

OBSTACLES AND SOLUTIONS FOR RISK-BASED PLANNING FOR SMALLER UTILITIES

Brenley McKenna, Mary Smith, Edwin Paulson
The Water Research Foundation & Stantec

Obstacles and Solutions for Risk-Based Planning for Smaller Utilities and Limited Budgets (Project #4970)

Many resources have been developed by various organizations to help utilities of all sizes improve their sustainability through riskbased planning. Risk-based planning analyzes scenarios of threats and consequences an determines the courses of action to mitigate them. Risk-based planning also involves determining business risk exposure (BRE) and identifying actions to reduce BRE.

Small utilities have unique constraints and challenges that can be barriers to developing and implementing these types of plans. While these resources are effective, there are still barriers for small utilities to use these resources. Therefore, this research developed the Small Utilities Resource Framework for Risk-Based Planning (Resource Framework) assist small utilities to incorporate risk-based planning into their decision making.

Integrated, risk-based planning can help utilities account for, and overcome, challenges such as aging infrastructure, population shifts, climate change, and stricter regulatory requirements, along with the uncertainty that surrounds these challenges. However, successful implementation of these planning efforts can be out of reach for smaller utilities with limited resources. This project addressed this gap by focusing specifically on small utilities, proactively seeking their input in developing a strategy to successfully implement integrated, risk-based planning strategies that also address social equity issues within their unique constraints. This project developed (1) a framework that leverages and refines existing resources to address issues specific to small utilities, and (2) a training program to deliver tools and resources to small utilities in a format accessible to staff with limited time and resources. Published in 2022.

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1:30 P.M. THU., FEB 9

ROOM **314**

THIRD PARTY VALIDATION OF ARTIFICIAL INTELLIGENCE FOR WATER REUSE

Andy Salveson, Kyle Thompson, Jason Assouline
Carollo Engineers

Data-driven, efficient operation is needed to save cost and energy in the water industry, especially in the rapidly expanding reuse sector. A partnership between Yokogawa Electric Corporation and Carollo Engineers—with independent evaluation through the National Water Research Institute and extensive support from utility partners—has been conducting desktop simulations of artificial intelligence (AI) solutions for the Las Virgenes – Triunfo Joint Powers Authority for two years in both activated sludge and subsequent advanced treatment for reuse. Now, this interdisciplinary team is implementing a cloud-based, semi-autonomous, human-machine interface to implement AI solutions at full-scale in real-time. Demonstrated efficiency gains, operator experience, and lessons learned will be presented.

HWEA

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1:30 P.M. THU., FEB 9

ROOM **315**

TRICKLING FILTER SYSTEMS FOR 21ST CENTURY

Jia Zhu, Joshua Sablan, John Harrison
Brentwood Industries, Inc. & John Harrison Consulting

Trickling filter (TF) related systems have been the workhorse of the biological wastewater treatment for over 100 years. Major changes in TFs occurred in the mid 1990's with the introduction of plastic media (vs rock media), and speed control (vs hydraulic) distributors. Yet with all of these changes, there has been little increased understanding of the added capability provided by TFs. Information from design engineers and end users on TF improvements has been largely unrecognized or poorly reported. The objective of this presentation is to increase the understanding of "modern" TF systems. Modern TFs systems use high-performance, structured-sheet plastic media with speed-controlled distribution and enhanced ventilation systems. These changes can save significant space since TFs can now be constructed from 30 to 40 feet in media depth, which reduces the treatment footprint With proper design and operation, modern TFs achieve equivalent performance for BOD removal and nitrification to most activated sludge processes. Trickling filters achieve aerobic condition through "passive aeration". An EPRI (2013) report indicates that energy consumption of TFs is approximately 50% lower than conventional activated sludge and SBR systems, and approximately 80% lower than MBR systems. A TF system is more environmentally friendly and has a smaller carbon footprint than other biological treatment systems. One UK Environment Agency (2009) study indicated that GHG emission from TFs is approximately 24% lower than GHG emission from activated sludge systems. Operation and maintenance of TFs is also less complex compared to activated sludge systems. This savings is because of TFs having fewer moving parts and use natural versus mechanical aeration. Process control parameters are also far less with TF systems. Common problems with activated sludge such as sludge bulking and nocardia foaming are non-existent with TF operation. This presentation will introduce the new generations of TF media and process integration with other treatment technologies. Integrated technologies include trickling filter-solids contact, roughing filter-activated sludge, trickling filter-denitrification filter, and more. Selected case studies from U.S., Europe and Africa will be presented to demonstrate the performance capability of TFs and energy efficiency features. Best practice of operation and maintenance for optimizing TF performance will also be discussed.

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1:30 P.M. THU., FEB 9

ROOM **316A**

THE NEW EMERGING AMI AND IOT SYSTEMS - SMART WATER / SMART CITY

Kevin Cornejo
Mueller Water Products

The New Emerging AMI and IoT Systems - Smart Water/ Smart City Participants in the presentation will learn about the current network design standards today and be introduced to the newer types of networks available under a NaaS (Network as a Service) Models utilizing LoRAWAN Class A/B networks or Cellular based solutions to support smart city initiatives and IoT of Water. Participants will learn all the of the available options in the marketplace today focusing in on the Smart Water Smart, Smart City/ IoT, and which models may best fit their goals and needs. Each attendee will be able to evaluate which model will best support their business initiatives while mitigating risk to satisfy their business goals for increased efficiency, water conservation, and prolonging asset life on the water side, or in a City in Environment how to use a smart city network to add in traffic lights, streetlights, parking meters, Electric and gas as well as other sensors. This presentation will discuss the availability of what water sensors are on the market today for smart water such as: pressure, distribution leak detection, customer leak detection, meter reading, water quality, valve actuation and how these sensors bring data back to hosted software platforms and touch on smart city sensors as well.

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2:05 P.M. THU., FEB 9

ROOM **311**

IMPROVING TERTIARY PROCESSES AT LAHAINA WASTEWATER RECLAMATION FACILITY

Carl Koester, Tony Ali, Juan Rivera
Jacobs / County of Maui

The County of Maui owns and operates the Lahaina Wastewater Reclamation Facility (WWRF) producing reuse water for community users. Improving overall plant performance by providing improved efficiency for tertiary processes is critical for the County of Maui to produce a reliable source of reuse water as there is growing demand for this resource.

The treatment process experiences diurnal flows that impact tertiary treatment. The magnitude and duration of peak flows causes operational challenges with UV treatment channels. For example, an additional channel may need to be energized for a short peak flow event then shuts down once the peak flow subsides. This issue is caused primarily from the series of pump stations conveying flow to the plant from Lahaina and Napili communities. After evaluation, it was determined to use secondary effluent equalization EQ compared to aeration basin influent equalization. A comparative analysis was completed demonstrating equalization of secondary effluent met the project goals most cost-effectively.

A detailed design was prepared to implement secondary equalization at the Lahaina WWRF. The design incorporated existing, previously abandoned tanks, which realized a cost benefit to the County of Maui. Not only did this approach allow significant cost savings, it also reserves area on the site for future growth. The secondary equalization tanks were designed with variable speed pumps and a control system that will allow peak flow events to be dampened as flow is conveyed to the tertiary treatment system. The control system utilizes the existing Supervisory Control And Data Acquisition system to include new control screens and historians for data logging. The design also includes temporary pumps and piping that allows bypassing flow to allow piping tie-ins with minimum anticipated disruption to plant operations. Construction work has been awarded with completion scheduled for early 2024.

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2:05 P.M. THU., FEB 9

ROOM **312**

OPERATING IN THE DARK

Dave Brearley
HDR

Practical steps for planning and practicing a SCADA Outage event. For many utilities, the newer generations of staff have become reliant upon automation for daily operations, they have not operated a facility in manual nor experienced a significant event requiring operation without automation and it is common that the staff with the experience has never transposed that knowledge to written plans (they just "know what to do").

The presentation will review key findings, lessons learned, and recommended system improvements which have lessened the burdens of manual operations as identified by Water and Wastewater utilities which have implemented similar exercises. As one utility noted "When we powered down a PLC panel, we had no idea of the interdependencies. We lost power to instruments not associated with the area that the panel was located and lost communications of flows to other areas of the plant". Another utility noted significant struggles with resourcing running without controls for a sustained period of time due and provides recommendations for disaster recovery steps that include a unique approach semi-automatic operation that lowered the burden on staffing until business continuity could be obtained.

While each utility's systems and processes are unique, there is commonality that can be applied for a phased approach to outage exercises. Phased scenarios of increasing complexity can control risk to the operation, identify gaps in documentation and skill sets, and ultimately verify the organization's ability to achieve CISA Shields Up objective "Maximize the organization's resilience to a destructive cyber incident: If using industrial control systems or operational technology, conduct a test of manual controls to ensure that critical functions remain operable if the organization's network is unavailable or untrusted." Phasing will allow utilities to scale the simulated outage time frame and systems affected up to a full outage spanning multiple shifts to ensure complex scenarios such as shift change without automated controls can be achieved while maintaining treatment within regulatory requirements including data collection. The phased approach is currently being exercised by multiple utilities across the US.

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2:05 P.M. THU., FEB 9

ROOM **314**

EMERGING CONTAMINANTS: PFAS IN STORMWATER

Yvana Hrovat and Nancy Gardiner
Haley and Aldrich

Stormwater has been gaining increasing attention as a potential migration pathway for per- and polyfluoroalkyl substances (PFAS). PFAS are often referred to as "forever chemicals," because they persist in the environment and do not tend to break down. They are a large class of chemicals with thousands of different individual compounds. PFAS are referred to as "emerging contaminants," because they have not commonly been monitored in the environment yet are suspected of causing adverse impacts to human and/or ecological health, even at extremely low concentrations.

PFAS compounds are resistant to water, oil, and grease. Because of these unique physical and chemical properties, they have been widely used in industry as well as consumer products. Common examples include non-stick cookware, food packaging, waterproofing, and aqueous fire flighting foams. There are numerous pathways whereby PFAS can be released to the environment, including industrial emissions, wastewater treatment plants, and landfills. Once in the environment, stormwater acts as a significant transport mechanism to mobilize PFAS into surface and groundwater, thus introducing them to drinking water and recreational waterways. While there are no regulatory requirements for treating PFAS in stormwater, the United States Environmental Protection Agency (EPA) and various states are investigating these chemicals for possible regulation. EPA published a roadmap in 2021 outlining the steps to move from its current health advisory to enforceable regulation of certain PFAS compounds. Additionally, the Bipartisan Infrastructure Law provides $10 billion in funding to address PFAS and other emerging contaminants in water.

This presentation will cover the basics of what PFAS are, common uses, and how they are mobilized by stormwater. It will also address the state of regulation in the United States and recent regulatory developments, new analytical methods to measure PFAS at low (parts-per-trillion) concentrations, and technological approaches to treating/destroying PFAS. This presentation will be of interest to a wide range of participants, including staff from municipal public works departments, military agencies, transportation agencies, regulatory agencies, and consultants, who will benefit from understanding what the class of constituents includes, why stormwater is a concern for its distribution in the environment, current regulatory efforts, and new technologies to control them.

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2:05 P.M. THU., FEB 9

ROOM **315**

INNOVATION APPLICATION OF ULTRAVIOLET LIGHT IN PRIMARY EFFLUENT AT SAND ISLAND

Wayne Lem, Xavier Martinez, Laura Black, Mack McPherson
Trojan Technologies & Hawaii Engineering Services

Traditionally, ultraviolet (UV) light has been the last step in the sewage treatment process widely employed for secondary treatment and, as in Sand Island, increasingly for chemically enhanced primary treatment (CEPT) i.e. primary sewage. In many municipalities, sewage quality can be found worsening, resulting in very low UV transmittance and higher suspended solids, which lead to faster aging of UV equipment, extensive maintenance and energy requirements, and compromising the treatment plant performance. To overcome such challenging effluents, innovations and advancements were introduced in the UV plant design for a more reliable solution.

In this project, the City and County of Honolulu, the UV manufacturer and other stakeholders set out a vision to tackle the challenge, using best modern practices, lowest possible life-cycle cost, minimal operating and maintenance and lowest environmental impact. The partnering philosophy of the stakeholders gave the City the best possible innovative UV solution, with holistic consideration of cost, quality and performance over the whole life-cycle of the UV system. Primary sewage at Sand Island is challenging for disinfection due to its water quality with high suspended solids, leading to increased quartz sleeve fouling and faster aging of the UV system.

In the past, this situation required traditional open-channels with horizontal-lamp UV systems with a higher lamp count, adding extensive maintenance efforts. To overcome this, an advanced inclined-lamp reactor design with automatic features to minimize operator intervention resulted in a breakthrough for Sand Island Wastewater Treatment Plant.

The installation of the new UV reactor in the first of six channels enabled verification in a real environment, in particular for energy efficiency, treatment performance, monitoring and automation, and simplification of operation and maintenance. Experience with this case study UV design along with its treatment performance, operating and maintenance savings, lessons learned, and operator feedback will be presented. Having gained full confidence from all stakeholders, the proposed innovative inclined-lamp UV system design was implemented in the full-scale at Sand Island, for a total of six (6) channels, with the benefits of the system being realized.

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2:05 P.M. THU., FEB 9

ROOM **316A**

WHY IS APL/INDUSTRIAL ETHERNET TECH RELEVANT TO MANAGING ENVIRONMENTAL SYSTEMS?

Nick Hanson
Endress+Hauser

Industrial Ethernet protocols such as EtherNet/IP are nothing new for the Environmental Industry. They have been available and utilized on 4 -wire instrumentation technologies such as Flow and Liquid Analysis for several years. With the advent of the IEEE 802.3 cg standard and APL technology, Industrial Ethernet protocols will soon expand to 2-wire instruments like Level, Pressure and Temperature. For both General Purpose and Hazardous Area installations.

The big questions on everyone's mind are:

Is there value in having Industrial Ethernet protocols in traditional 2-wire 4-20 mA HART capable instruments?

How does APL/Industrial Ethernet fit into my long term IIoT/Industry 4.0 strategy?

This technical session will review the practical value of Industrial Ethernet technology regardless of the type of instrument.

1. Facility Unification of an Ethernet infrastructure throughout a plant or operating unit.
2. Extensive bandwidth enabling more information at faster speeds
3. Ease and economy of set up and use due to widespread familiarity with and availability of Ethernet

More importantly we will discuss the practical implementation of an APL architecture and how this in conjunction with an Industrial Ethernet protocol can advance your IIoT/Industry 4.0 strategy through:

- Two-way communications with advanced diagnostic capabilities to decrease downtime and improve efficiency?
- Predictive Maintenance
- Reduction of unscheduled and better control over scheduled maintenance
- Assist with implementing operational improvements using tools such as digital twins.

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3:20 P.M. THU., FEB 9

ROOM **311**

FROM INDEPENDENCE TO INTEGRATION: BUILDING THE WEST POINT CAPITAL PROGRAM

Heather Stephens and Stephen Nuss
Stantec Consulting Services

The West Point Treatment Plant (WPTP) provides secondary treatment for approximately 700,000 residents and businesses in Seattle and northern King County with a rated peak capacity of 440 million gallons per day. Faced with the need to complete more than 20 projects with a total cost of more than $660 million over the span of 10 years on a highly constrained site in a sensitive location, the King County Wastewater Treatment Division (WTD) initiated the West Point Capital Program (WPCP). The goals of the Program are to:

- Deliver asset management projects at the WPTP more efficiently than historical projects of a similar size.
- Reduce the ratio of non-construction to construction spending.
- Recognize project interdependencies and increase coordination between projects.
- Improve satisfaction of WPTP operations staff who work on capital projects as partners in project delivery.
- Reduce the overall risk associated with delivering multiple projects simultaneously on a space constrained site.

This presentation will describe how the Program developed from an initial focus on small- to medium-sized projects to ultimately encompass all capital projects at the WPTP and highlight some of the key tools and processes developed through the Program. These tools and processes have helped WTD to document and manage dependencies between planned projects, communicate program-wide project management, design, and construction resources needed, identify and manage interfaces between ongoing design and construction activities, streamline project design and construction, anticipate and mitigate risks associated with concurrent project execution, and improve coordination between project teams and plant operations and maintenance staff.

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3:20 P.M. THU., FEB 9

ROOM **312**

CONDITION ASSESSMENT OF A SUB-AQUEOUS PIPELINE USING NON-INVASIVE TECHNOLOGY

Gary Skipper, Mark Poppe, Jacob Quick, Michael Metcalf
Brown and Caldwell & California American Water

Brown and Caldwell was contracted to perform a Reliability Study for the California American Water (CAW) Transbay Main, a 50+ year old 4,000-foot, 24-inch diameter welded steel, cement mortar lined and somatic coated pipeline. This non-redundant, subaqueous potable water transmission main crosses beneath San Diego Bay running from the City of San Diego Convention Center to the Ferry Landing in the City of Coronado.

Access to the pipeline is extremely limited, constraining commercially available technology options for inspecting the structural integrity of the pipeline. In both San Diego and Coronado, extensive permitting, excavation and disruption at popular tourist destinations would be required for construction of insertion/ extraction fittings to accommodate inline inspection tool use.

BC selected an innovative solution – the pipeline Condition Assessment Technology (p-CAT™) developed by Detection Services (Australia), provided within the U.S.by Hydromax USA. p-CAT is a non-invasive (external), non-destructive testing (NDT) system for measuring average pipeline wall thickness while the pipeline remains in-service.

p-CAT consists of a transmitter and receiver located on opposite ends of the pipeline, mounted on existing appurtenances. p-CAT transmits a pressure pulse into the water, which interacts with the pipeline walls during transit. The receiver measures/records the pulse. Changes in wall conditions, such as wall thickness variation, manifest as an alteration to the pulse shape. Data are post-processed, and results presented as average wall thickness over 30-foot long pipeline sub-sections. p-CAT is used as a "screening level" tool to identify localized areas of concern that might require more detailed inspection. Data analysis also identifies areas of interest such as pipe material changes, gas/air pockets, and pipeline appurtenances. p-CAT can be applied to multiple pipe materials, including metallic, concrete, and AC (asbestos cement) pipes.

p-CAT inspection was conducted by installing the transmitter on the pipeline at San Diego and the receiver at Coronado. Several rounds of data acquisition were performed to ensure valid data, with raw data QC review occurring on-site. Transmitter and receiver positions were then reversed, and data were again acquired. This paper presents a description of the project and constraints realized during planning, a description of the p-CAT technology, field efforts to acquire data, and inspection results.

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PRESENTATION **90**

3:20 P.M. THU., FEB 9

ROOM **314**

ACCESSING FEDERAL FUNDING

Panelists: Dana Okano, Melissa Unemori Hampe
Moderator: Christin Reynolds
One World One Water

In 2013, Hawaii Community Foundation launched the Hawaii Fresh Water Initiative to bring diverse parties together and develop a forward-thinking strategy to increase water security in Hawaii. This resulted in three ambitious targets for 2030: 100 million additional gallons per day from three sources:

- 40mgd (million gallons per day) in increased water availability through conservation,
- 30mgd through recharge, and
- 30mgd through wastewater reuse.

By increasing water security, Hawaii will be better set to deal with predicted trends of reduced rainfall, higher evaporation rates, and declined stream flows. To reach these targets, Hawaii has transitioned to a one water mentality regarding water management that focuses on cross sector partnerships, innovation, education, and valuing all water resources.Recently the Hawaii Community foundation has been helping entities to apply for various federal streams of funding such as grants, cooperative agreements, loans, and contracts for various water infrastructure needs, including existing and new funding within the Infrastructure Investment and Jobs Act (IIJA).

This panel will touch on the federal funding landscape, share about the technical support so far and open up the discussion for opportunities to access technical assistance in the future to apply for and manage federal dollars.

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PRESENTATION **91**

3:20 P.M. ROOM **315** THU., FEB 9

DITCHING DISINFECTION? PATHOGEN REMOVAL CAPABILITIES OF MEMBRANE BIOREACTOR

Kathleen Peach, Grant Macinnis, Stephen Katz
Veolia WTS

Membrane Bioreactor (MBR) technology achieves secondary and tertiary wastewater treatment in one compact step. This technology has been used to treat wastewater for over 30 years and is considered best available technology for achieving high quality effluent. MBR has demonstrated a significant degree of bacterial rejection, which provides potential cost savings opportunities to utilities by reducing or eliminating additional disinfection steps. Demonstrated removal of viral and protozoan pathogens also makes MBR a strong choice for utilities that may want to reuse the treated water for non-potable or potable purposes, either now or in the future.

This presentation will share data collected from more than 10 MBR facilities in North America and Europe to provide a benchmark of the long term microbial and pathogen removal performance of full scale MBR installations. The facilities all use ultrafiltration membranes and were selected to include varying membrane age, hydraulic capacity and geographical location. The geometric mean concentrations in the effluent prior to disinfection across all the plants examined in this study for E. coli, fecal coliforms, and total coliforms were 1.1 CFU/100mL, 1.6 CFU/100mL, and 2.6 CFU/100mL, respectively. The results demonstrate the ability of MBR technology to produce effluent that meets typical regulatory limits for surface water discharge. Recent cases also demonstrate that regulators have granted municipalities the allowance to bypass disinfection, due to the permeate quality achieved by MBR systems. Removal of virus and protozoa by MBR systems will also be addressed, looking at empirical data of virus and giardia removal from operating facilities, showing high removal of these pathogens. This data demonstrates a benefit of MBR technology in reuse applications, or for utilities that want to be prepared for potentially reuse needs.

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PRESENTATION **92**

3:20 P.M. THU., FEB 9

ROOM **316A**

DIGITAL TRANSFORMATION ENABLES SMART WATER INITIATIVES

Janine Nielsen
Rockwell Automation

sustainable use of water. Water, and how it is managed, plays a critical role in the Smart Cities of tomorrow. The Internet of Things (IoT) and big data are factors that have combined to unleash the smart water concept. The traditional conservative water & wastewater sector will face mounting pressure to adapt from customers, partners, and stakeholders. This pressure will be compounded by a host of economic, environmental, regulatory, and cultural changes, which will challenge utilities core business & operating models and make status quo approaches to water, wastewater, and stormwater management increasingly untenable. Water utilities and organizations are investing in Smart technologies and solutions to accelerate the digital transformation to address these industry challenges.

During this session, we will discuss factors driving the transformation to digital water, water industry trends, and industry innovations and present a customer case study Optimizing Aeration Basin Operations by Using AI for Continuous Control.

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PRESENTATION **93**

3:55 P.M. THU., FEB 9

ROOM **311**

FIRST US INSTALLATION OF ADAPTIVE CLARIFIER INLET

Mario Benisch
HDR

The first US adaptive clarifier inlet installation has been commissioned in Norfolk, VA. This technology has the potential to resurrect old shallow clarifiers to perform equal or better than a modern deep clarifier. This can lower compliance cost for many utilities that may otherwise require replacements, additions, or filters. Upgraded clarifiers (in Europe) have demonstrated a 60% to 95% reduction of clarifier effluent solids and proven capacity gains up to 50%. These water quality gains enable this technology to produce filter effluent quality water at 20 – 30 percent of cost.

Conventional clarifiers are generally limited in their performance by the settling characteristics of the biological sludge and hydraulic conditions in the clarifier. The Hydrograv Adapt variable inlet structure (HA) changes that. Unlike traditional inlet structures, mixed liquor is introduced near the clarifier bottom into sludge blanket. In addition, the inlet elevation and opening height adapts to the load thus always operating under ideal hydraulic conditions. By introducing the flow near the bottom of the clarifier the internal horizonal recirculation cause by the volume displacement from incoming flow. This increases the horizonal velocity (less time for particles to settle), shrinks the clear water zone, and can disturb settled sludge during peak loading conditions, all of which are addressed are addressed with the adaptive inlet. Embedded in the functioning principal is also blanket filtration. With MLSS introduced into the sludge blanket, flow filters through the blanket, comparable to a contact clarifier.

The first US adaptive inlet at the Nansemond WFR has already been in operation for more than two years but was limited to manual operation due to pandemic related delays until August 2022. Yet still the average effluent turbidity was below 2 ntu and lower than the control clarifier. During stress testing at the Nansemond WRF, effluent turbidity remained under 2 ntu at peak loading rates around 1,200 gal/sf/d and 65 lb/sf/d. The results suggest that the adapt clarifier now has 30% more capacity. Further testing will confirm if one of the planned two new 160 ft clarifiers can be eliminated based on the archived capacity gains, which would save over $10 million after accounting for upgrading two existing clarifiers and equipping one new clarifier with adaptive inlets.

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3:55 P.M. THU., FEB 9

ROOM **312**

DIP IN HAWAII: MAINTAINING PROJECT BUDGETS AND SCHEDULES

Jeff Mason, Adam Martin, Aubra Aina
US Pipe

Are you a project engineer, owner, or manager? Regardless of your relationship to the water works industry and local projects, it is likely that factors such as availability, pricing and product details are important to the success of your projects. This presentation will examine how recent changes in both the local and global markets impact the costs and timeline for the end user. We will discuss factors such as freight, raw material costs, local specifications, and issues unique to Hawai'i. Attendees will gain insights into these crucial considerations as well as resources and suggested contacts to stay best informed.

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3:55 P.M. THU., FEB 9

ROOM **314**

IRRIGATED LANDSCAPE AREA FEATURE EXTRACTION TO DEVELOP WATER USE TARGETS FOR RESIDENTIAL CUSTOMERS

Cassidy Harding
Hawaii Water Service

Irrigated Landscape Area Feature Extraction to Develop Water Use Targets for Residential Customers.

Hawaii Water Service's Conservation Department utilized Esri's deep learning capabilities to classify land cover within its service areas in order to develop efficient water use targets for its residential customers. With the image analyst extension available in ArcGIS Pro, a land use classification model was trained on 0.5m resolution aerial imagery of Maui and Hawaii counties. The output of this model combined with the outputs of Esri's pre-trained building footprint and road extraction models was used to compute irrigated landscape area at the parcel level. Irrigated landscape area estimates were utilized to generate customer-specific water targets that take into account additional variables including regional climatic conditions and household size. These water targets provide customers with an individualized metric to guide consumption from month to month, exposing excessive usage and promoting efficiency. The Conservation Department also uses the targets to identify regions of inefficient water use and forecast demand scenarios.

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PRESENTATION **96**

3:55 P.M. THU., FEB 9

ROOM **315**

POWER OF PEER EXCHANGE: INNOVATION AND DECENTRALIZED WASTEWATER SOLUTIONS

Julie Waechter, Stuart Coleman, Al Smith, Jennifer Hyde
Dig Deep / Wastewater Alternatives and Innovations

2.2 million Americans lack running water or safe access to sanitation at home - an access gap that has significant economic impacts on households in Hawai'i and across the country. Every year the water access gap remains open in the United States, we lose an estimated $8.58 billions a nation and 18 million statewide in the form of decreased household earnings, higher healthcare costs, lost tax revenues, and labor market disruptions. These findings were highlighted in the 2022 release of Draining: The Economic Impact of Closing the Water Gap. Drainingmakes several suggestions toward closing the water access gap, including the creation of a domestic Water, Sanitation, and Hygiene (WaSH) sector, which would allow organizations to coordinate response efforts to water and sanitation issues with greater efficiency.

One prominent example of effective cross-organization coordination is the Decentralized Wastewater Innovation (DWI) Cohort. Approximately 20-25 percent of all wastewater systems nationwide are decentralized, yet these systems lack visibility, funding, and innovation. The DWI Cohort is a community -driven response effort, led by the nonprofit organization DigDeep to improve understanding of the common decentralized wastewater challenges Americans face, creating a vehicle for collaboration and solution sharing. Through peer-to-peer site visits, DWI Cohort members have developed an effective model for building partnerships and information exchange.

Communities throughout the US face similar sanitation challenges, yet they often lack the opportunity for meaningful connection that would enable them to share approaches, compare data, and exchange support and encouragement. The DWI Cohort seeks to remedy these needs, using collective meeting power to identify challenges, and offer policy solutions. Current cohort members include organizations from Hawai'i, Alaska, Navajo Nation, New York, and Alabama.

This presentation will focus on the success of the DWI Cohort and the importance of replicating similar initiatives across the nation. Dig Deep will be partnering with the Hawaii–based NGO WAI: Wastewater Alternatives & Innovations to talk about the state mandate to convert more than 88,000 cesspools across the Islands. They will discuss regional and national policy recommendations to bring more awareness, funding and direct services to decentralized wastewater solutions.

HWEA

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3:55 P.M.

ROOM **316A**

THU., FEB 9

ADOPTING OPTIMIZED SMART TECHNOLOGY O&M PROCESSES: 3-CASE STUDIES

David Belomy, Jay Boyd
ADS Environmental Services

Utilities typically use the EPA CMOM guidance that prescribes cleaning to avoid SSOs. The total collection system is cleaned on an ongoing basis and sites with historic rapid build-up are cleaned at high frequencies e.g., monthly. Yet, cleaning maintenance teams often find that they are cleaning already clean pipes. While this practice can reduce SSOs, it has the potential for wasting resources. With labor shortages now impacting utilities, overcleaning is not sustainable.

Problematically, cleaning teams do not know actual pipe conditions. Seeking solutions to remedy this, some utilities postulated that smart technology could help by providing continuous remote site condition feedback to determine when to clean. They would also have fulltime SSO prevention at those sites.

Testing this hypothesis, three case studies are provided, all of which have employed smart technology as a tool to determine when to clean, supplanting the wasteful schedule-driven process. In all cases, monitors were installed at high frequency cleaning sites. Depth measurements were taken every 15-minutes. Data was sent wirelessly to cloud-based software and users had viewing access to all sites. Of significance, machine learning-based analytics with pattern recognition algorithms enabled predictive warnings of build-up.

Case 1: 10 sites, 6-months. They would have cleaned 60-times. With the new approach they cleaned 12-times. The cost per segment cleaned was $400. With 48 sites not cleaned, the productivity savings was $19,200, $38,400 annualized. The implementation cost was $33,650, thus covering all first-year costs. In years 2 & 3, the operating cost of 10-sites would be $5,000/yr resulting in a net gain of $23,400/yr.

Case 2: 20 sites, 4-months where 8-sites were cleaned weekly and 12 cleaned monthly. Cleaning was reduced by 94% cumulatively with an accompanying $74,000 productivity savings, $222,000 annualized. The implementation cost was $67,300 resulting in a $154,700 first-year net benefit.

Case 3: large US utility; 3,000 miles of sewer where 25 smart tech monitors were installed for 1-year. They achieved an 87% cleaning reduction with all implementation costs covered.

These examples have been realized by a rapidly growing number of utilities creating substantial evidence that scheduled cleaning is wasteful as it promotes overcleaning. With ongoing monitoring at high frequency cleaning sites, utilities also acquire continuous SSO protection.

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4:30 P.M. THU., FEB 9

ROOM **311**

BACK TO BASICS - ADDING PRIMARY CLARIFICATION TO A SECONDARY WASTEWATER TREATMENT PLANT

Luke Werner
Kennedy Jenks Consultants

The City of Roseville (California) operates the Pleasant Grove WWTP (PGWWTP), which needed additional capacity due to anticipated acceleration of growth within the PGWWTP service area. The existing facility consisted of influent bar screens, grit removal, oxidation ditches, secondary clarifiers, tertiary filters, UV disinfection, and centrifuge dewatering of waste activated sludge (WAS). Large quantities of unstabilized, dewatered sludge were being hauled through local residential neighborhoods to a regional landfill, resulting in excessive truck traffic and odor complaints.

Kennedy Jenks designed a $54M expansion project to increase the PGWWTP capacity from 9.5 to 12.0 MGD, improve solids stabilization and resulting disposal options, reduce the overall biosolids quantity, and lower the energy demand of the secondary treatment system. Improvements include four primary clarifiers, three rotary drum thickeners generating thickened waste activated sludge (TWAS), two anaerobic digesters for stabilizing a combination of primary sludge and TWAS, ferric chloride storage and dosing for hydrogen sulfide control, centrate storage, auxiliary systems, biofilter odor control, and process piping. A separate PGWWTP project included the addition of high-strength waste (fats, oils, and grease and food waste slurry) to boost digester gas production, and conversion of this gas to compressed natural gas (CNG) for onsite vehicle fueling.

Biological process modeling was used to evaluate the impacts of the new processes and recycle streams on existing treatment capacity and effluent quality, in particular the high-ammonia centrate stream resulting from centrifuge dewatering of anaerobically digested sludge. City O&M staff were instrumental in developing control strategies, integrating the new processes into the existing control systems, and updating the existing SCADA system to meet the City's operational needs, while continuing to meet stringent NPDES requirements. Significant cost savings were realized through creative design, including converting two existing WAS storage tanks into digested sludge and centrate storage rather than constructing new vessels. The project is being delivered under a design-assist procurement method, with the first phase (primary clarifiers, thickening, digestion) completed in 2022, and the balance of plant anticipated for 2023.

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4:30 P.M. THU., FEB 9

ROOM **312**

LOS ANGELES' ADVENTURES IN WATER LOSS

Ariel Flores
Los Angeles Department of Water and Power

In California, water loss control has become a hot button issue for local and state agencies. Several California regulations, including the Long-Term Water Conservation Regulation. Assembly Bill 1668, Senate Bill 606, and more specifically, Senate Bill 555, incorporate provisions for water loss auditing requirements and Urban Water Retail Supplier (UWRS) specific real and apparent water loss standards. For the past eight years, the Los Angeles Department of Water & Power (LADWP) has proactively pursued water loss control through the efforts of its Water Loss Task Force (Task Force). The Task Force is an intra-departmental collaboration of more than 100 employees throughout LADWP's Water Divisions, as well as its Customer Service, Financial Services, and Information Technology Divisions. It was formed to implement the recommendations of the Water Loss Audit and Component Analysis Study (Study) which was completed in June 2013. In September 2015, the Task Force completed an Action Plan to guide the process of implementing the recommendations presented in the previous study, and is currently pursuing all feasible and cost-effective actions.

These actions include:

- Increasing pressure monitoring and conducting pressure management studies
- Creating a regular acoustic leak detection program
- Installing advanced metering infrastructure on fire service meters to prevent theft
- Testing a representative sample of customer meters
- Enhancing production meter calibration and maintenance procedures
- Streamlining operations and leak repair databases

This presentation will give insight into how LADWP turned the recommendations from the Study into an implementable, comprehensive water loss control program by assessing the feasibility and cost-effectiveness of the actions needed. It will explore the challenges of coordinating a system-wide implementation project and the importance of identifying critical avenues of communication within an organization, large or small. Finally, it will share the lessons learned thus far, and explore potential challenges that may be faced in the near future. This presentation will benefit other water agencies wanting to assess and implement their own water loss control measures by giving practical insights into an Action Plan that is working effectively for the City of Los Angeles.

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ROOM **314**

COMMUNITY DRIVEN GREEN INFRASTRUCTURE: KAIMUKI RAIN GARDEN

Dan Dinell
Trees for Honolulu's Future

Go small, go fast. Using an actual case, Trees for Honolulu's Future will share the story of a resident initiative transforming a 500 square foot forlorn land remnant into a rain garden that can process approximately 900 gallons of surface water runoff per hour.

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4:30 P.M. THU., FEB 9

ROOM **315**

WASTEWATER TREATMENT PLANT CONSIDERATIONS OF AIR MOVEMENT EQUIPMENT

Craig Thornton
Hartzell Air Movement

Corrosion Protection, Maintenance, and Economic Considerations for Wastewater Treatment Plant Fan Equipment

Wastewater treatment plants process and handle some of the most corrosive solids and liquids throughout process engineering, often causing damage after a prolonged operation to pipes, tanks, pumps, electrical conduit systems, as well as air movement equipment.

Air movement equipment is exposed to extremely corrosive chemical environments. Materials of construction must be durable against corrosion, meet mechanical requirements and perform economically over the life of the wastewater treatment plant. Composite materials based on Fiber Reinforced Thermoset Polymers (FRP) have been shown to provide superior durability to alternative materials such as corrosion resistant alloys.

Fans, ductwork and other ventilation constituents must be constructed from materials resistant to corrosion. Sodium hypochlorite and sodium hydroxide are odor control chemicals used to precipitate out H2S and SO2. Those two chemicals actually hydrolyze, forming sulfuric acid. Bleach and chlorine are commonly used disinfection chemicals, but they themselves are also highly corrosive.

Corrosion resistant alloys, such as stainless steel, is reasonably durable but far from the most economical choice. Fiber Reinforced Thermoset Polymers (FRP) is the choice of material for air movement FRP Fans as an essential component within wastewater treatment plants worldwide. FRP Fans are quite economical and gives remarkably long service life. When the best resin and cure systems are selected and the fabrication design is optimized, FRP Fans will often last for decades.

This presentation will demonstrate best available technology for FRP Fans in corrosive chemical environments based upon laboratory testing and extensive field service in multiple locations.

PRESENTATION **102**

4:30 P.M.

ROOM **316A**

THU., FEB 9

SMALL SYSTEMS ROUNDTABLE

No abstract.