WIPAC
Water Industry Process Automation and Control

WIPAC MONTHLY

The Monthly Update from Water Industry Process Automation & Control

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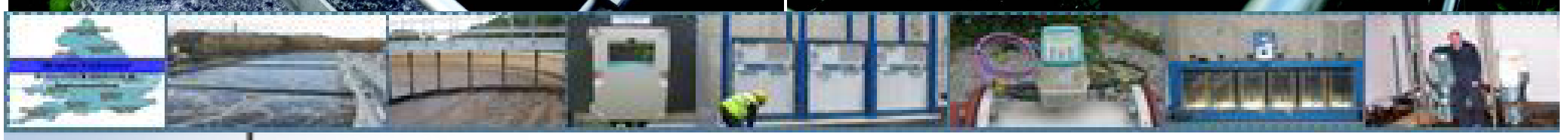

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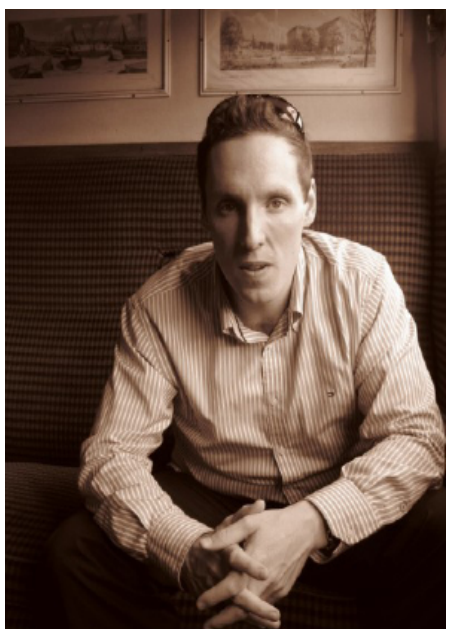
From the Editor



Sitting in a meeting this month the issues that are sloshing around the water industry got to the point that it can be summarised in two words "massively overwhelming." There are quite simply so many problems associated with the water industry at the moment that two questions come to mind "Have we got the money?" and even with all of the money "Have we got the resources within the industry and the right skill level to deliver on all of the demands that are being made upon the industry?".

An example of this is a phone-call that I had this month from an old colleague who works in hydraulic modelling and we ended up discussing the Colebrook-White equation and whether you can derive the flow rate derived from differential level with the sewer environment. Theoretically its possible but the level of uncertainty that you will get associated with the implied measurement is so high that, at least for hydraulic modelling purposes, the actual result is worthless. The person I know who was studying this around five years ago was Laurent Soliec who was, at the time, working for the flow measurement company, Nivus. In my opinion Dr Soliec was an absolute genius when it came to area-velocity measurement and he had some, but limited success, in the area of sewer level and flow derivation.

This all comes back to the point though of - "what do you want to achieve by the measurement that you are trying to make?" If the purpose of the measurement is unclear then so will the results that you get and so will the uncertainty of the measurement that you are trying to achieve. Why is this important? Well in the short-term its wasted investment and secondly in the near-medium future the level of monitoring within the anthropogenic water cycle is going to literally explode. The danger is, if there is a lack of direction of why and consequently how we are measuring that there will be a lack of focus in the monitoring itself and this invariably leads to "the resistance to the effective use of instrumentation," that I seem to have been banging on about for over a decade now.

So, where am I going with all of this? More and more there seems to be a driver for more and more data and making the data "open" so that it can be seen by anyone with the slightest inclination in real-time. The question of course we should be asking is not for "open data" it is for open information that will actually tell the consumers of that information, in the appropriate time, what they need to know. Sitting behind that information should be the data that is calculating what the situation is and because of the nature of the information and the originating data there should be management systems to ensure that the information that is being delivered is correct. An example of this is the event duration monitoring and overflows information that at the end of February will be passed over to the Environment Agency for 2021. This will be splashed across the press as it was last year and when you drill down to it the quality of that data is not known. Is it 100% correct - the simple answer is no. Does it give a good indication of the situation - probably. However, that is with quality control procedures being implemented and ensuring that the data is the best representation of the real situation that it can be. Bring that data into an "open format and in real-time" then the uncertainty of the information starts to grow and grow.

Sir James Bevan this month warned that we, as the public, get the water quality that we pay for and that inevitably the cost of water bills will have to invariably risk. Why? As all of the monitoring, information and resulting actions are going to drive things in that direction. What we have to make sure is that the decisions that we are going to inevitably have to make are based upon the right information and the resulting actions are going to cause alot of wasted time and money.

Have a good month

Oliver

Industry News

Affinity Water – using Citizen Science projects and real-time monitoring to improve health of region's chalk streams

Affinity Water has released two podcasts explaining how Citizen Science projects and Real-Time Monitoring are being used to help improve the health of the region's chalk streams. In a new podcast Affinity Water talks to Professor Kate Heppell, from Queen Mary University of London, who has been seconded for a year to work with the Chilterns Chalk Streams Project to monitor the health of precious chalk streams in the Chilterns AONB.

Standing by the River Chess at Restore Hope Latimer, Professor Heppell, explains why studying the pressures on chalk systems and rivers is important and how local people, through Citizen Science and volunteer programmes, and the use of sensors and real-time data can help to tackle water quality issues in rivers.

In the first podcast, Prof Heppell says that nationally there are four big challenges associated with the health of chalk streams:

- physical modifications which can impact the flows;
- agricultural pollution in rural areas;
- sewage and wastewater treatment issues;
- urban diffuse pollution with run off from roads and towns as well.

She explains that turning concern about river health into action is key and that local authorities and highways agencies, conservation bodies, and local landowners, farmers and NGOs involved in the wider catchment activities need to work together to bring about change, as well as the water only and sewage companies themselves and householders who use water.

Affinity Water's Save Our Streams campaign has so far achieved over 170,000 sign ups and saved 5 million litres of water every day. The region is known to have one of the highest water uses in the UK and to be the home of 10 per cent of the world's chalk streams, approximately 24 in all.

In 2020 Affinity Water announced its commitment to end unsustainable abstraction from these precious rivers, which was followed by voluntary action to stop abstraction from two sources in the Chess Valley. Affinity Water and Thames Water have also recently worked with Arup to develop 'chalk stream health metrics', a set of indicators to provide a health baseline and help identify more actions for improving ecosystem services within the catchment, such as water quality, recreation or climate regulation.

Professor Heppell has been seconded to the Chiltern Chalk Streams Project for a year to help identify the baseline water quality of the river Chess through a five-year project that involves water companies, Local Authorities, local landowners and NGOs. According to Professor Heppel, Citizens' Science projects will play a key role in the future and she is urging the public to get involved:

"These rivers are classified as being over-abstracted which has led to low flow issues. We have to consider flows in the long term and how they will change due to population growth and climate change. We have multiple complex problems that are going to impact these rivers in the future, so we do all need to work together in partnership, including the public and citizen science initiatives which help to monitor the quality of water in the river."

In a discussion with Paul Jennings, Chair of the River Chess Association in the second podcast, Professor Heppell explains how for the past two years a water quality sensor in the river has helped to monitor the quality of the water every fifteen minutes and that data can be sent to her mobile phone:

"These sensors can be connected to your computer or iPad so that you can see what the water quality is doing in real time as well. In the future we should be using more of these sensors networked together to look at river health and water quality to be able to then create predictive models of what is happening in response to climate change and population change in our catchments."

Paul Jennings, Chair of the River Chess Association is also a supporter of improved river monitoring. He said:

"The sensor data, is helping us to provide a really clear picture of how the river health is moving. In the past we gathered data perhaps once a month, or at other time when incidents happened but that may have been too late, this data gives us a consistent record over a period of time. The equipment has become more sophisticated and more robust. This is one of four sites we have on the River Chess, and we are looking to supplement this.

"Citizens Science programmes are assisting with these; they can work on helping to keep them clean and gather other data such as on river flies. I am optimistic because the general public has got behind this, ten years ago very little was known about it, now people are more aware and are telling the politicians that using rivers for sewer discharges is unacceptable.

"Kate's involvement is hugely important to us. We have someone who is an expert and can set up water quality monitoring systems. We are establishing procedures and putting in place the right equipment and right teams of people to get accurate data and without that data we can't move forward."

The podcasts are available by clicking here for Part 1 with Professor Kate Heppell and here for Part 2 with Professor Hellpell and Paul Jennings.

Ofwat Chief orders water companies to spell out plans to protect river health

Ofwat has recently called on water companies to spell out plans for how they will cut the harm they cause to rivers in England. Writing to the Chief Executives of the water companies in England, David Black, Ofwat's interim Chief Executive, said there were “significant concerns” that the sector was not meeting its obligations or public expectations on the safe treatment and return of wastewater to the environment, commenting:

“The roll out of comprehensive monitoring has revealed the frequent use of storm overflows as part of the day-to-day operation of the wastewater system. This cannot continue.”

Referring to new duties in the Environment Act 2021 for water companies to reduce environmental and public health harm from the use of storm overflows, he went on to comment that this came in light of new evidence that the companies are regularly releasing sewage into the environment through storm overflows, which are meant to be used as a safety valve to prevent the sewer network becoming overwhelmed at times of heavy rainfall.

He told the water chiefs that improving the sector's impact on rivers and reducing harm from storm overflows would require their companies to understand and address the root causes of the issue.

David Black said:

"I expect water companies to own responsibility for the impact they have on the environment. That means better measuring and monitoring to understand the impact as well as reducing the harm they cause. Customers and the wider public want to know how their water company is stepping up to address environmental concerns. Actions can and must start now, I want companies to spell out their actions and intended impacts and time-frames for reducing harm to our rivers."

Ofwat expects the company plans to run up to March 2025. The published plans should support, and relate to, any company response to forthcoming targets from Government regarding improvements to river quality.Today's intervention comes after Ofwat issued a letter to water company remuneration committee Chairs reiterating that performance related remuneration should reflect performance for customers and the environment.

In parallel, Ofwat is conducting a live investigation related to companies' management of their wastewater treatment works. The regulator expects to issue an update in the coming weeks on the progress of this investigation and any further action it intends to take.

“Companies must act now – there is nothing in regulatory regime that prevents companies from tackling these issues immediately”, he said.

The letter says that to achieve a change in performance, the water companies will be expected to publish their plans to reduce the harm to river water quality from their activities, including those caused by storm overflows, before the end of April 2022.

The plans will also need to be specific about the actions to be taken, including their impact and time frames for delivery for the period to end of March 2025.

The letter concludes that by reminding the Chief Executives that the regulator has an ongoing investigation related to companies' management of their wastewater treatment works and that an update on progress, and any further action Ofwat intends to take, would be issued in the coming weeks.

UK Patent Office Grants Detectronic Patent For LIDoTT Technology

The LIDoTT, a multi-sensor monitoring system designed and developed by wastewater monitoring specialists, Detectronic, has been granted patent number GB2591274, which covers open channel fluid level monitoring apparatus comprising two level sensors with overlapping monitoring ranges. Designed to deliver the measurement accuracy needed to deliver truly smart sewer networks, LIDoTT incorporates decades of knowledge and experience. LIDoTT represents a generational advancement in level monitoring technology. With temperature, pressure and ultrasonic technologies combined in a single sensor, LIDoTT raises the bar when compared with existing level monitoring solutions.

Explains Neil Butler, managing director at Detectronic: “The development of the LIDoTT has been truly ground-breaking in the field of wastewater monitoring tech as it is enabling water companies across the world to meet new management challenges and adhere to ever-more stringent environmental regulations.

“We are pleased the UK Patent Office has recognised the uniqueness of our LIDoTT technology and granted this patent. It clearly differentiates LIDoTT from its competitors and provides Detectronic with a sustainable advantage in the wastewater monitoring market.”

LIDoTT delivers a single, continuous level data set as it transitions seamlessly from data obtained from the ultrasonic sensor to the data obtained from the pressure sensor making it equally effective during both normal and abnormal (surcharged) operating conditions. This is particularly beneficial for water utilities, allowing them to implement a truly smart sewer network solution where millimetric accuracy is essential at all times.

As a highly versatile and cost-effective solution, it can be quickly deployed either in specific (problem) catchments or throughout an entire network.

Adds Neil: “When LIDoTT data is fed into our Artificially Intelligent, machine-learning software, DetecAnalytics, or any other AI analytical system, their delivered predictions are much more accurate and dependable for operational decision making. As such, water companies can realise even more efficient sewer management and maintenance programmes, surpass regulatory requirements and ODI targets and deliver tangible operational cost-savings.”

Government updates water companies on security and emergency measures required in the interests of national security

The Government has issued a new Ministerial direction to water and sewerage companies in England and Wales setting out the outcomes they must meet in the interest of national security and for the purpose of mitigating the effects of any civil emergency.

The Direction begins by saying that “it appears to the Secretary of State in relation to English water and sewerage undertakers and English water supply licensees” and “to the Welsh Ministers in relation to Welsh water and sewerage undertakers and Welsh water supply licensees” that it is “requisite and expedient in the interest of national security and for the purpose of mitigating the effects of any civil emergency to give them directions.”

The new Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022 comes into force immediately with effect from the beginning of March The Direction goes into some detail about the measures the companies are expected to have in place and the processes and procedures they are expected to follow. It also refers to the country’s critical national infrastructure, defining it as those elements of infrastructure, including assets, facilities, systems, networks and processes and the essential workers that operate and facilitate them, the loss or compromise of which could result in:

- a major detrimental impact on the availability, integrity or delivery of essential services including those services which, if compromised, could result in a civil emergency, or
- a significant impact on national security.

The Directions sets requirements the water companies are expected to meet in terms of planning, including:

The company must make, keep under review and revise such plans as it considers necessary to ensure, during any civil emergency or event threatening national security:

- either the continued exercise of all of its functions;
- or,the continued exercise of those functions it can continue to exercise if the nature of the civil emergency or security event means that not all the functions can be exercised.

The water companies are expected to have plans in place for all of their water supply systems and treatment works. In the event of an unavoidable failure of piped water supply, they must ensure that a minimum supply is provided by alternative means. With regard to sewerage functions, plans must be prepared on the basis that the company must guard against and deal with discharges from sewers into water which may be abstracted or where aquatic life may be adversely affected, or onto land where a discharge may cause pollution or affect the amenities of the area.

The plans must also make provision for strategically stored reserves of sufficient types and quantities of equipment and materials necessary to enable the company to continue to carry out its water supply or sewerage functions. Where a company has arrangements in place with an external supplier or provider for the supply of additional water to supplement its water supply resources, the company must also identify and assess any risks that may arise due to its dependence on the external supplier. In addition, the companies are expected to have “appropriate emergency communication facilities and procedures” in place for managing and maintaining communications and support to customers throughout an emergency or security event. The Direction stipulates that they also need to establish “appropriate command and control arrangements” to manage an emergency or security event

All of the companies are required to regularly test the effectiveness of their plans to ensure they remain appropriate and to take steps to address any vulnerabilities identified. The Direction also sets Ministerial expectations of the companies in terms of the identification and assessment of security risks, including long term risks, to the provision of their water supply or sewerage functions, including their asset base and supporting restructure, during a civil emergency or event threatening national security.

The Direction says the companies must “use such up-to-date technology and systems as are appropriate to ensure the ongoing security of relevant assets, supporting infrastructure and their operations.”

Personnel and incident reporting

The wide-ranging Direction also requires the utilities to have the following security measures in place in respect of personnel:

- processes for personnel to report security event risks and incidents;
- robust security incident response processes; and
- measures to ensure that staff have the appropriate level of security clearance.
- regularly test the effectiveness of security measures, policies and practices to ensure they remain appropriate to manage risks posed to security;
- take steps to address any further security risks or vulnerabilities that are identified.

The companies must also:

- notify the appropriate authority, together with any other organisations and people that may be affected by any actual or likely emergency or security event as soon as it becomes aware of this.
- undertake an annual audit of the assets which they have been notified as being classified as critical national infrastructure by the appropriate authority

The new Direction has been issued this morning under the authority of Rebecca Pow MP, the Parliamentary Under Secretary of State **for the Environment, Food and Rural Affairs and Julie James, Minister for Climate Change, one of the Welsh Ministers.**

Endress+Hauser Introduces Netilion Water Networks Insights

The innovative, cloud-based monitoring solution from Endress+Hauser paves the way to comprehensive optimization and automation for water networks—from anywhere at any time.

Netilion Water Network Insights (NWNI) enables full transparency for water networks around the clock by providing reliable monitoring of flow, pressure, temperature, level, water quality, and other measurements. This software service connects all levels of water supply systems, empowering service providers and water associations to manage multiple control and data sources through a single interface. These sources include field devices, industrial controllers, data transfer components, data recording and archiving devices, analysis and forecasting tools, and others.

NWNI provides access to all measurement data gathered in a water network and transmitted to the cloud, whether its users are accessing the system from a control room computer, via a laptop at home, on a tablet in the field, or from a smart-phone on the move. The web-based interface provides users with complete system monitoring, and when limit values are exceeded, or in the event of failure, it delivers alarms to users via e-mail, SMS, or push notifications.

The software system includes many evaluation tools, including time curves, diagrams, tables, and trends, and by incorporating external data sources—such as weather prediction systems—users can also create trend analyses and forecasts. These tools help inform characteristics, like run-off during heavy rainfall, consumer water demand, and expected availability.

Secure and flexible connectivity options are critical for modern facilities, and NWNI provides these with cutting-edge data exchange technologies. All communication is encrypted and secure, even in remote regions with a self-sufficient power supply, providing data reliability and integrity.

NWNI provides facility personnel with system-wide views, reducing required rounds and verifying functional operation of remote spring taps, elevated reservoirs, pipelines, pumping and distribution stations, and more. This makes it possible to keep close tabs on a broad range of system values and quality parameters including:

- Comprehensive water quantity and quality monitoring around the clock
- Accurate custody transfer allocation and cost accounting
- Reliable leak locating
- Weather impacts
- Energy efficiency and optimization
- NWNI for wastewater – complying with environmental regulations

Industrial, commercial, and municipal wastewater regulatory agencies mandate many water quality parameters to protect the environment, so facilities must treat wastewater in several stages prior to discharge. To maintain compliance, these facilities must carefully monitor water quality, substance concentrations, pollution loads, and other parameters.

NWNI ensures wastewater treatment organizations meet or maintain these requirements at all times of the day, by assisting operations with:

- Reliable forecasts of in/outflows and water quality by leveraging current weather data and state-of-the-art analysis algorithms
- Optimal sizing of wastewater treatment plants through the comprehensive knowledge of effluent substance concentration and material loads in catchment areas
- Reliable substance concentration control by using data from liquid analysis devices
- Precise flow and concentration measurement to ensure accurate billing of wastewater charges
- Biological process risk mitigation by monitoring influent substance concentrations

In water custody transfer, infinitesimal inaccuracies in flow measurement can create significant billing discrepancies. Although frequent testing can reduce the occurrence of these errors, it historically required removing flowmeters from service for testing and calibration. Frequent removal is often impractical, particularly on large water pipelines over a few feet in diameter.

Addressing this challenge, Endress+Hauser's integrated Heartbeat Technology testing functionality provides verification of flow meter measurements with the push of a button. Users can view these automatically generated verification records in NWNI.

NWNI provides system-wide visualization and record keeping, improving regulatory, reporting, and custody transfer accuracy. These tools help water agencies streamline operations, improve decision-making, and increase revenue streams.

Wastewater Is Laden With Valuable Community Data

Just about everything ends up at a sewage facility before being cleansed and discharged into a local river, lake, or even used to irrigate farmland. But less understood is the fact that wastewater systems can be a real barometer of a community's health. That largely unseen maze of pipes and processes has helped keep us safe from sicknesses that once ravaged the world, such as cholera, typhoid fever, and polio.

In recent years, technology has improved enough to allow wastewater engineers to perform an even more valuable public service, testing and evaluating wastewater for community and environmental insights. Around the world, wastewater is being tested for changing levels of human hormones and pharmaceuticals. Rising levels of the female hormone estrogen, linked to birth control pills, have been linked to sex changes in some fish species downstream from hormone-laden wastewater discharges.

Though estrogen has been found to naturally degrade in the wild, biologists still voice concerns about the long-term consequences on aquatic environments. Removing estrogen from urban wastewater streams would cost taxpayers many millions. But it is there in growing quantities and knowing that is an important start.

Medicines are another emerging issue. When doctors prescribe pharmaceuticals, they are thinking of the patient's immediate health, but many of those same drugs can end up passing through wastewater plants.

Though more than 1,400 pharmaceuticals have been approved by the FDA for sale, few are being treated at wastewater plants, and the consequence on fish and other aquatic populations is mostly a mystery.

According to the Water Science Centre of the US Geological Survey, "Acute ecotoxicity data are available for only a small portion of these compounds, and chronic toxicity data are even scarcer. In addition, little is known about the ultimate environmental fate of most pharmaceuticals. These knowledge gaps prevent a full understanding of the effects of pharmaceuticals, if any, on non-target organisms in the environment."

Putting technology to work to identify these chemicals and remove them from the wastewater, or even reduce their emissions from the source, should be an imperative for our policymakers and the public at large. A similar problem exists with microbeads, a new technology that adds tiny plastics to cosmetics and cleaning products. Some consumers may apply microbeads to their skin without knowing the ultimate consequence on ocean and river life. Greenpeace has called microbeads "toxic time bombs."

As much as 2 million tons of plastic microbeads now pollute the world's oceans and contaminate the world's fish. Microbeads are difficult and expensive for engineers to remove from wastewater.

The broader issue with hormones, pharmaceuticals, and microbeads is that we all should be more cognizant of what we are dumping into our sewage system and more determined to remove them from our wastewater.

Modern wastewater testing technology is continuously getting better at detecting and tracing dangerous pollutants in our wastewater. Wastewater engineers can play an important role in helping regulators identify the companies responsible for these hot loads.

Companies themselves also can benefit from waste-tracking. High loads of pollutants in wastewater often are a sign of inefficient industrial processes. A company flagged for discharging contaminated wastewater can learn from its mistake and improve its operations. As far as health monitoring is concerned, the most recent — and perhaps most valuable — example of new wastewater technology has come during the COVID-19 pandemic. Doctors and scientists have monitored wastewater flows to detect the rise and fall of the virus in numerous cities around the world.

COVID detection tests in wastewater have helped communities prepare hospitals for an expected surge of patients. They have also warned public health officials when extra community protection measures might be warranted.

"Depending on the frequency of testing, sewage surveillance can be a leading indicator of changes in COVID-19 burden in a community," reported the U.S. Centres for Disease Control.

With new technologies for wastewater treatment, dangerous pollutants in the water supply can be detected early and addressed, making this precious — and exhaustible — resource safe for reuse in our lakes and oceans, on our farms, and for human consumption as drinking water. We owe it to our environment and each other to do nothing less.

Semtech's LoRa Devices And The LoRaWAN Standard Provide Internet Of Things Connectivity For ICTnexus Smart Islands Project

Semtech Corporation, a leading global supplier of high performance analog and mixed-signal semiconductors and advanced algorithms, announced a joint collaboration with ICTnexus, an information communications technology and Internet of Things (IoT) solution and service provider, to bring LoRaWAN connectivity to the Cook Islands. As part of the ICTnexus Smart Islands project, an IoT platform will feature Semtech's LoRa devices as well as a LoRaWAN network for the Island's infrastructure. Implementing LoRaWAN allows for several smart island use cases including energy metering, water management, air quality and weather stations, street light operation, asset tracking, and emergency notifications (tsunami sirens).

"Scalability was key in choosing the right technology to develop the Cook Islands into truly smart islands," said Tai Kauraka Tangaroa, chief executive officer at ICTnexus. "As we start with Rarotonga to launch, building IoT infrastructure across 15 islands is no simple task, but the strong capabilities of Semtech's LoRa devices and LoRaWAN standard provided an ease of deployment and scalability this comprehensive project requires to succeed. ICTnexus and Semtech are bringing the smart island concept to life with the Cook Islands."

According to ICTnexus, this deployment is the first energy management systems leveraging LoRaWAN on the Pacific Islands. The long distance communication capability of LoRaWAN is ideal for this type of project, connecting all IoT-enabled devices for applications for the Island's power grid, utility meters, gas meters, turbidity sensors for the water treatment plant, water flow and treatment sensors, water tank level sensors, waste water monitors, and smart water meters. In addition, one of the main applications in connection with the Cook Island Climate Change Program is energy monitoring and management. All aforementioned applications will also feature a management platform for operators to view data in real time to maintain the Island's operations.

"The concept of a smart island is no longer a concept as the potential of LoRa and the LoRaWAN standard continues to be embraced worldwide," said Marc Pégulu, vice president of IoT product marketing and strategy for Semtech's Wireless and Sensing Products Group. "The Cook Islands' investment for a robust IoT-based infrastructure with LoRaWAN is a great move to improve the lives of its citizens."

ABB Launches Innovative Digital Solution To Reduce Energy Use And Optimize Operations In Wastewater Plants

ABB has launched ABB Ability Smart Solution for Wastewater, a digital solution which addresses the un-precedented challenge faced by wastewater treatment plant operators to achieve both the lowest energy use, and the highest operational standards.

The innovative solution is composed of two main pillars, advanced process control (APC) and digital twin and simulation technology to forecast future operational needs. It will help wastewater treatment plants reach optimal operating conditions by reducing process variability and stabilizing operations through continuous monitoring and automation. This enables constant, incremental operational adjustments and gains, reducing energy consumption and chemical usage, alongside increasing profitability.

According to the International Energy Agency, global electricity consumption in wastewater treatment reached 222 TWh in 2020, with electricity usage across the sector predicted to increase by 80 percent by 2040[1]. This is in part due to the increasing demand for treated wastewater, which is now considered a valuable potential resource[2].

Marco Achilea, Global Segment Manager, Water & Infrastructure, ABB Energy Industries, said: "This new product leverages our long-standing expertise in advanced process control, performance optimization and digital twin technology. With the demand for treated wastewater rapidly growing around the world, our goal is to continue to develop sustainable solutions that reduce energy use whilst improving water quality and operational efficiency."

Developed with hydraulic modelling intelligence from the Danish water environment specialists, DHI Group, the ABB Ability Smart Solution for Wastewater creates a more stable treatment process by predicting wastewater inflow together with environmental factors such as weather patterns, reducing risk of overflow and fines. ABB Ability Smart Solution for Wastewater will be the first in a family of smart solutions for the water industry. Building on the experience and solid performances of ABB's Optimax and APC, this first offering is designed to make wastewater treatment plants safer, smarter, and more sustainable.

CDC adds wastewater to COVID Data Tracker

The Centres for Disease Control and Prevention (CDC) recently announced that it is adding wastewater data to its COVID Data Tracker platform and is massively expanding its wastewater surveillance. Since its launch in Sept. 2020, CDC's National Wastewater Surveillance System (NEWS) has collected over 24,000 samples representing 53 million Americans. With its new addition to CDC's COVID Data Tracker, visitors will be able to track the virus levels in an area's wastewater over the previous 15 days. Without the platform, comparing COVID data between states can be difficult to compare: many regions use different methods for their analysis. With NEWS's consistent methodology, and the Data Tracker's existing features, users will now be able to compare wastewater data across states directly.

This nationalization of wastewater epidemiology has many benefits outside of the COVID-19 pandemic; wastewater surveillance is applicable to many different health concerns. This wastewater data will only be available for participating areas. Currently, NEWS surveys 37 states, four cities, and two territories through its 400 active testing sites. However, CDC also announced that hundreds more testing sites will begin submitting wastewater data within a few months.

The new testing sites come as part of a commercial testing contract, which will help provide twice-weekly testing to 500 additional sites nationwide within a few months. CDC plans to add data from at least 250 sites within only a few weeks.

"One of the strengths of wastewater surveillance is that it is very flexible," said Kirby. "Once we have built this infrastructure . . . We can add tests for new pathogens fairly quickly.

New DNA Computer Assesses Water Quality

Northwestern University synthetic biologists have developed a low-cost, easy-to-use, hand-held device that can let users know — within mere minutes — if their water is safe to drink.

The new device works by using powerful and programmable genetic networks, which mimic electronic circuits, to perform a range of logic functions.

Among the DNA-based circuits, for example, the researchers engineered cell-free molecules into an analog-to-digital converter (ADC), a ubiquitous circuit type found in nearly all electronic devices. In the water-quality device, the ADC circuit processes an analog input (contaminants) and generates a digital output (a visual signal to inform the user).

The research was published today (Feb. 17) in the journal Nature Chemical Biology.

Equipped with a series of eight small test tubes, the device glows green when it detects a contaminant. The number of tubes that glow depend upon how much contamination is present. If only one tube glows, then the water sample has a trace level of contamination. But if all eight tubes glow, then the water is severely contaminated. In other words, the higher concentration of contamination leads to a higher signal.

“We programmed each tube to have a different threshold for contaminations,” said Northwestern’s Julius B. Lucks, who led the research. “The tube with the lowest threshold will light up all the time. If all the tubes light up, then there is a big problem. Building circuits and programmable DNA computing opens up many possibilities for other types of smart diagnostics.”

Lucks is a professor of chemical and biological engineering in Northwestern’s McCormick School of Engineering and a member of the Centre for Synthetic Biology. The paper’s co-authors include Jaeyoung Jung, Chloé Archuleta and Khalid Alam — all from Northwestern.

The new system builds off work that Lucks and his team published in Nature Biotechnology in July 2020. In that work, the team introduced ROSALIND (named after famed chemist Rosalind Franklin and short for “RNA output sensors activated by ligand induction”), which could sense 17 different contaminants in a single drop of water. When the test detected a contaminant exceeding the U.S Environmental Protection Agency’s standards, it either glowed green or not to give a simple, easy-to-read positive or negative result.

To develop ROSALIND, Lucks and his team employed cell-free synthetic biology. With synthetic biology, researchers take molecular machinery — including DNA, RNA and proteins — out of cells, and then reprogram that machinery to perform new tasks. At the time, Lucks likened ROSALIND’s inner workings to “molecular taste buds.”

“We found out how bacteria naturally taste things in their water,” he said. “They do so with little molecular-level ‘taste buds.’ Cell-free synthetic biology allows us to take those little molecular taste buds out and put them into a test tube. We can then ‘re-wire’ them to produce a visual signal. It glows to let the user quickly and easily see if there’s a contaminant in the water.”

Now, in the new version — dubbed ROSALIND 2.0 — Lucks and his team have added a “molecular brain.”

“The initial platform was a bio-sensor, which acted like a taste bud,” Lucks said. “Now we have added a genetic network that works like a brain. The bio-sensor detects contamination, but then the output of the bio-sensor feeds into the genetic network, or circuit, which works like a brain to perform logic.”

Researchers freeze-dried the reprogrammed “molecular brains” to become shelf-stable and put them into test tubes. Adding a drop of water to each tube sets off a network of reactions and interactions, ultimately causing the freeze-dried pellet to glow in the presence of a contaminant.

To test the new system, Lucks and his team demonstrated that it could successfully detect concentration levels of zinc, an antibiotic and an industrial metabolite. Giving the level of contamination — rather than a simple positive or negative result — is important for informing mitigation strategies, Lucks said.

“After we introduced ROSALIND, people said they wanted a platform that could also give concentration amounts,” he said. “Different contaminants at different levels require different strategies. If you have a low level of lead in your water, for example, then you might be able to tolerate it by flushing your water lines ahead of using them. But if you have high levels, then you need to stop drinking your water immediately and replace your water line.”

Ultimately, Lucks and his team hope to empower individuals to test their own water on a regular basis. With inexpensive, hand-held devices like ROSALIND, that may soon become a reality.

“It’s clear that we need to enable people with information to make important, sometimes lifesaving decisions,” Lucks said. “We’re seeing that with at-home tests for COVID-19. People need at-home tests because they need that information quickly and regularly. It’s similar with water. There are many cases where water quality needs to be measured routinely. It’s not a one-time thing because contamination levels can change over time.”

The study, “Programming cell-free biosensors with DNA strand displacement circuits,” was supported by the U.S. Department of Defense, the National Science Foundation, the Crown Family Centre for Jewish and Israel Studies and the Searle Funds at The Chicago Community Trust.

UK company develops early main burst detection tech

One United Kingdom company, Ovarro, has developed a cloud-based main burst detection system to help water companies keep pace with tightening regulations. The UK government has left water companies in England in no doubt that they need to do more to protect the environment from pollution. Environment minister Rebecca Pow has said the nation's Water Services Regulation Authority must ensure that the water industry is doing more to protect the environment — and that water quality was "an absolute priority".

A government strategic policy statement, published on 2 February 2022, sets out its priorities for the regulator over the next five years and calls for measures to improve monitoring and reporting of pollution incidents, reduce harm from storm overflows, and tackle run-off from agriculture. The statement came days after the prosecution of a UK water company in January 2022, following a pollution incident back in 2017. The company was fined £233,000 ($311,000 USD) for the incident, which saw wastewater discharged from a rising main into a watercourse over four days.

Rising main sewers are high-risk, critical assets — but, with many in the UK ageing and becoming more vulnerable to bursts, proactive maintenance and investment may no longer be enough to keep up with the rate of deterioration.

In October 2021, another water company launched a five-day emergency operation, deploying tankers and clean-up teams to limit customer impact, after a burst rising main flooded a residential area. Given the mounting customer and stakeholder pressure and water companies' own commitments to cut pollutions, it is unsurprising they are working with the supply chain to develop innovative solutions.

Ovarro's example of a cloud-based early warning product, named BurstDetect, was developed in collaboration with UK utilities in direct response to the urgent challenge to reduce pollutions. The tool detects rising main bursts with potential to cause pollution incidents. Through a dashboard, it provides an overview of pumping station status and both ongoing and historical events. If data suggests a potential burst, an alert is sent to control rooms often within an hour of occurrence

This ensures users can make swift, informed decisions and quickly allocate resources to reduce environmental impact. Such early action can prevent the escape of sewage and resulting environmental damage, ensuring companies fulfil their environmental obligations and avoid fines, regulatory penalties and prosecutions and long-term reputational damage. Early warning technology can be applied to nearly all pumping stations — even those with just basic pump status monitoring — and often requires little additional hardware. The technology can accept data at a range of monitoring frequencies, with software that can then identify any abnormal pumping station behavior.

Students ponder smart meter strategies

Wessex Water's Young People's Panel has again finished and provided valuable input from the next generation of customers. A first for the UK water industry when launched in 2016, the panel is made up of sixth-form students (ages 16 to 18) who spend time with directors and senior managers before pursuing real-life tasks. They return a couple of months later to pitch their ideas in Apprentice-style presentations and compete for prizes.

Split into four teams, this year's panel were challenged to design the customer experience for a future roll-out of smart meters and were given seven weeks to carry out research and develop their ideas. They also took part in some in-depth discussions about storm overflows and sewer misuse, which suggested future customers are aware of and concerned by river pollution but had little understanding of the causes.

"The Young People's Panel was another fantastic success, with a really interesting and dynamic group of students taking part.," Andy Pymer, Wessex Water's executive director of finance and regulation, said. "The panel is a great way for us to gain insight into what matters most for young people so we can continue to provide excellent service for our next generation of customers. As well as the time spent at Wessex Water's Bath headquarters and the smart metering task, 15 of the panellists formed an online community and responded to questions on topics ranging from climate change to the community.

"The teams did an exceptional job delivering their presentations and they had lots of great ideas which will feed into our future metering plans," Pymer continued. "The experience is also mutually beneficial for the young participants who get the chance to learn about a large organization, spend time with senior leaders and add some really credible achievements to their CVs."

More than 300 students also took part in a wider school survey as part of the Young People's Panel. This included questions about the environment and Wessex Water's plans for the future.

Previous panel winners have seen their ideas implemented by Wessex Water, including a money-back guarantee for customers who switch to a meter.

Case Study:

Machine Learning for accurate coagulant dosing

A drinking water plant in the U.S. Northeast produces more than 700 million gallons of water annually to serve its City's 16,000 residents. Of the nearly two million gallons of source water treated daily, approximately one third is comprised of surface water, originating from a local creek. The remaining two thirds of source water comes from three groundwater wells. Source water is then combined and treated in a conventional coagulation/sedimentation/media filtration plant.

Like many conventional drinking water treatment plants, this one has long relied on jar testing and operator judgement to determine a proper coagulant dose. Because the plant is not staffed 24/7, and blended raw water quality varies—particularly during storm events—they sought a solution that allowed automated assessment of source water quality and determined an accurate coagulant dosage.

Consequences

Failure to maintain an optimal coagulation dosage can lead to serious consequences. Underdosing coagulant may cause pathogens like Cryptosporidium to break through filters, resulting in immediate public health concerns. Because pathogens and typical particulate natural organic matter are much smaller than media filter pore size openings, proper coagulation to capture solids is critical. It is also important to destabilize the repulsive forces found in colloidal suspension with a coagulant's charge neutralization properties. Additionally, under-feeding coagulant may contribute to incomplete treatment for Total Organic Carbon (TOC) reduction, for example, leading to regulatory compliance concerns. Such events can lead to a loss of public confidence in the utility.

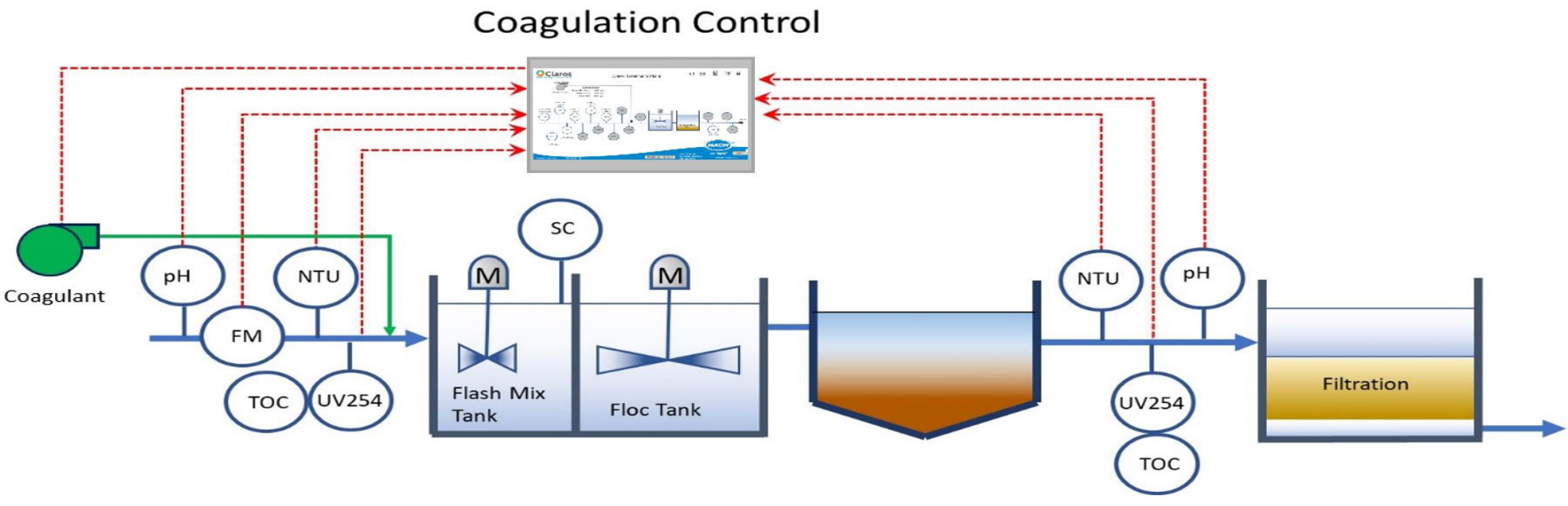
Overdosing coagulant is also undesirable. Economically, using too much coagulant is a waste of money as any dosing beyond the optimal amount consumes chemicals without improving finished water quality. Jar testing, while adequate to get a snapshot of the interaction between raw water and coagulant, is a relatively labour-intensive, time-consuming way of determining coagulant dose. It also cannot properly assess dynamic conditions that require more frequent, even continuous, monitoring of raw water quality parameters. That leads to managing coagulant dosing by instinct, usually yielding a tendency to use more chemicals than necessary.

Real Time Chemical Dosage Control

Hach has developed process management systems that combine real-time monitoring instrumentation with smart software, for a wide variety of applications, including one for source water coagulation optimization. This system, called RTC-COAG, predicts and doses coagulant chemicals automatically based on past patterns.

It does this using machine learning, a data analysis method that automates building analytical models. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human intervention. RTC-COAG software is "taught" how to dose coagulant using historical data.

Specifically, it learns based on how much coagulant was used in the past, raw water conditions at the time, and the drinking water quality produced. It detects patterns and uses those to predict outcomes based on current conditions. By replicating patterns that successfully produced quality drinking water in the past, it assesses current conditions and how they compare to past data to automatically deliver optimal coagulant dosages in real time.



How it Works

RTC-COAG needs, at minimum, six-months of data on raw water turbidity, pH, temperature, pre-filter (applied) turbidity, and coagulant dosage. It helps if data is also available on organics (TOC, SUVA, UV254, etc.), raw water alkalinity and hardness, streaming current, and more. Data can come from the lab or from online instruments. The software can also draw data from electronic spreadsheets or databases like Hach WIMS.

The software uses a combination of modified feedback PID loops and feed-forward algorithms to determine the right dosing strategy for coagulation stability and efficiency. It's much more than that, though. It works with existing SCADA systems, and uses machine learning and a variety of parameter inputs to adjust coagulant dosing in real time, optimizing chemical costs and ensuring compliant finished water.

Using past data, the software is trained to make algorithm-based decisions to generate a prediction of optimized results from the past, in comparison to how operators made decisions on dosing. The difference is the optimization results, or savings in the case of over-dosing, the software helps the plant realize.

What's Gained

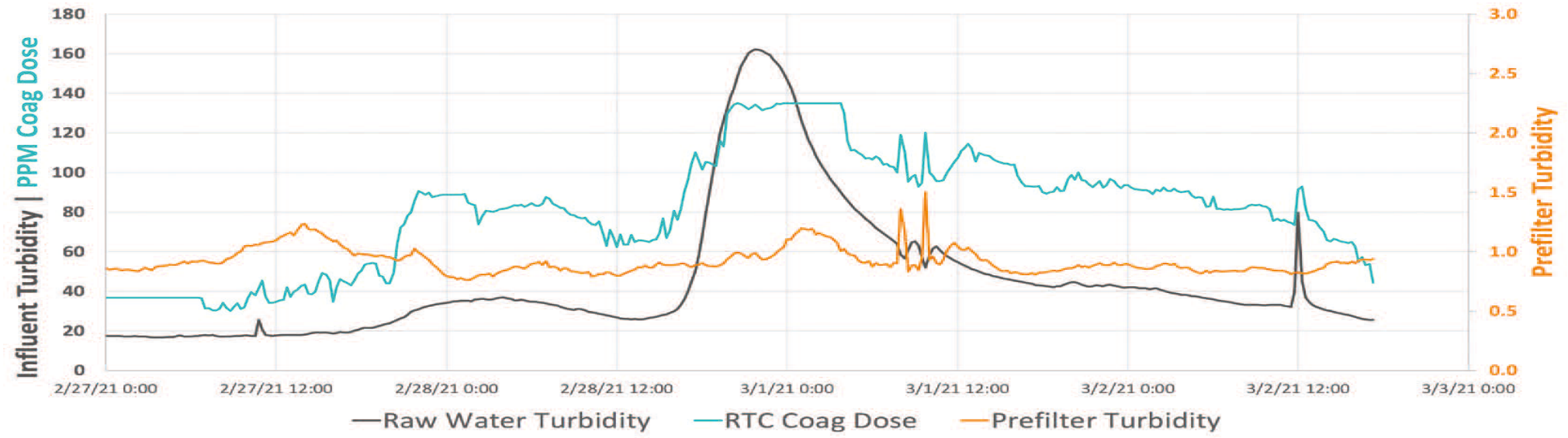
Benefits of the software include real-time coagulation process visibility, consistent finished water quality, time savings, optimized chemical use, reduced operator effort, training and knowledge preservation, and a solution customized for each plant. RTC-COAG, like all Hach RTC software, has built-in fall-back strategies in case of malfunction and in other user-defined scenarios. It can be implemented alone or combined with other Claros solutions like Mobile Sensor Management™.

For plants not quite ready for full automation, RTC-COAG may be used in a feed-forward, recommendation-only mode. Maximum benefits are obtained through automation, but there is stand-alone value in the dosage recommendations which may, in turn, be manually implemented.

RTC-COAG in Action

Because of its variable water sources, the plant mentioned earlier uses raw water that stresses its process, particularly during rain events. At the end of February 2021, a significant rain event created a tenfold increase in raw water turbidity when the plant was unstaffed. Despite this sudden, large spike, RTC-COAG kept pre-filter turbidity at the 1.0 NTU set-point throughout. As important, after the event the software reduced the coagulation dose. Overall, RTC-COAG has generated a 10% savings on coagulant usage at the plant.

For as long as drinking water treatment plants have existed, managing the coagulation process has required a lot of experience from seasoned operators. Now, machine learning offers operators a more real-time, data-driven roadmap for their coagulant chemical dosing decisions. Chemical savings are important, but not the only reason to use RTC-COAG. Other key drivers include improved coagulation performance, process visibility, time savings, effective training, and a basis for key decision-making.



Conclusion

In the daily effort to use the ideal dose of chemical coagulant, drinking water plant operators work against a variety of challenging, constantly changing variables. When that work doesn't produce optimal results, money can be wasted on excess chemical used and substandard finished water quality.

Hach's RTC-COAG software uses machine learning and automated dosing to address these challenges. It adapts and adjusts to effectively treat any raw water quality conditions, considering flow, particle charge, pH, temperature, alkalinity, hardness, turbidity, and organic content that generate an ideal coagulant dose. RTC-COAG analyses past patterns to create a unique algorithm for your plant, automating coagulant dosing, providing dynamic, precise, real-time control of the coagulation process.

SWIG
SENSORS FOR WATER INTEREST GROUP

Sensing in Wastewater Based Epidemiology

9 March 2022
Webinar

Wastewater-based epidemiology has been used hugely within the Coronavirus pandemic to give forewarning of outbreaks and in public health engineering. As the world adjusts to a new normal there is a need for continued vigilance in regard to the "next variant" or the "next pandemic." This is the role that wastewater-based epidemiology holds in the future.

In this webinar of Sensing in wastewater-based epidemiology we look at the importance of the surveillance technique and how we can use modern sensing technology to act as a method of forewarning for the next potential public health crisis.

Chair: Oliver Grievson, Z Tech Control Systems

13:00 Introduction by the Chairman. **Oliver Grievson, Z Tech Control Systems**

13:10 The importance of wastewater-based epidemiology in public health monitoring. **Matthew Wade, Josh Bunce & Andrew Zealand UK Health Security Agency**

13:30 Origami-paper sensors for rapid and on-site wastewater surveillance. **Zhugen Yang, Cranfield University**

13:50 COVID-19 and Beyond: Emerging Technologies for WBE. **Helena Steeves, Luminultra**

14:15 The use of analytics in wastewater-based epidemiology to assist public health decision making. **Jacobo Illueca, Idrica**

14:40 Enhancing near-source sewage surveillance with population dynamics. **Chris Sweetapple, University of Exeter**

15:05 One-Step SARS-CoV-2 Wastewater Testing-"A Danaher Collaboration Solves Key Challenges faced with Wastewater Based Epidemiology (WBE)." **Jim Harbridge - Hach**

15:40 Discussion

16:00 Close

REGISTRATION: The rate for SWIG Member is £31, non members registration is £65 and for students, £26 unless their institution has SWIG membership. Registrations can be made by Tel 01934 830658 or to rosa.richards@swig.org.uk or using the on-line booking form.
Cancellation policy: Refunds can only be made if cancellations are notified at least 5 days in advance of the Workshop date.

Article:

The Nitrogen Sensor That Could Change Residential Onsite Wastewater Treatment

More than one in five households in the United States depend on septic or onsite systems to treat their wastewater. These systems provide critical water quality infrastructure, but they usually are not designed to remove nitrogen to the point that sufficiently protects coastal marine ecosystems. As a result, septic systems are known to contribute to eutrophication (excess nutrients), hypoxia (low levels of oxygen), and harmful algal blooms in marine and estuarine waters.

Dr. Qingzhi Zhu, Bud Dunbar, and Brian Feldman stand in front of their successful sensor at the Massachusetts Alternative Septic System Test Centre

EPA estimates that approximately 2.6 million septic systems in nitrogen-sensitive, coastal watersheds across the country could be good candidates for upgrading to innovative and alternative (I/A) onsite wastewater treatment systems. I/A systems can reduce nitrogen in septic effluent by 50 percent or more through conversion of nitrogen-nitrate into harmless nitrogen gas. However, acceptance and adoption of I/A systems by state and local regulators and homeowners has been slowed by the inability to cost-effectively manufacture and commercialize new systems and assure their long-term performance and effectiveness once they are in the ground.

To address the need to monitor effectiveness of I/A systems, EPA and co-sponsoring organizations launched the Advanced Septic System Nitrogen Sensor Challenge in 2017. The Challenge asked innovators to design nitrogen sensors capable of monitoring the long-term performance of I/A onsite wastewater treatment systems. In November 2019, Dr. Qingzhi Zhu of Stony Brook University and the New York State Centre for Clean Water Technology in Stony Brook, NY, won the Challenge's prize of $50,000 and eligibility for EPA funding for International Organization for Standardization's (ISO) Environmental Technology Verification (ETV) 14034 performance verification testing.

The winning prototype, called the Stony Brook Nitrogen Sensor, provides real-time nitrogen concentration and performance data on I/A systems, eliminating the need for expensive manual sample collection.

“A top performing nitrogen sensor that reliably measures nitrogen concentration in the effluent from I/A systems is an important step in bringing onsite wastewater treatment into the 21st century, and one step closer to achieving parity with the capabilities of centralized wastewater treatment,” said Kristina Heinemann, an EPA Region 2 scientist who has worked on this Challenge and subsequent verification testing since their inception.

In October 2021, after a rigorous six-month testing process, the Stony Brook Nitrogen Sensor met all the performance claims that were part of the ISO ETV 14034 verification test with outstanding accuracy and precision. In some instances, the sensor exceeded the Challenge's and ISO 14034 performance requirements.

The Stony Brook Sensor is still in the prototype phase, and the team is actively working towards manufacturing and commercializing the technology. Once on the market, use of the sensor will increase confidence in the long-term and permanent use of I/A systems. The sensor also presents potential to increase the accuracy of water pollution credits granted to water polluters contributing to storm-water or agricultural runoff in accordance with the Clean Water Act.

EPA staff have been integral in facilitating each step of the sensor development process and take great pride in being part of this innovative initiative.

“It’s been amazing to watch the progression of this project from a stakeholder desire to a tangible sensor,” said Ian Dombroski, a biologist in EPA Region 1. “We’re hopeful that this sensor will lead to the increased use of nitrogen-removing septic systems to combat our coastal nitrogen issues. Climate change will only exacerbate these issues, so scaling up system installation quickly, with the assurance this sensor will bring, is vital to our coastal ecosystems and economies.”

In coastal areas such as Cape Cod, the technology would greatly benefit residents who depend on the health of their waterways for recreation, subsistence fishing, small commercial fishing operations and tourism.

Septic systems are a permanent part of our nation’s wastewater infrastructure, especially for rural, remote, and even suburban areas that have no prospect of connecting to central sewers, or where connection to central sewers is not the environmentally preferable solution. Communities in these areas are often disadvantaged economically. Making upgrades to I/A systems and using a nitrogen sensor could be a step towards improving water quality and advancing environmental justice. The Stony Brook Nitrogen Sensor is one of the new technologies that will allow “unsewered” areas to reach water quality parity with communities supported by centralized wastewater treatment facilities.

Case Study:

Non-contact LaserFlow performance at Hamburg WWTP influent and effluent

Teledyne ISCO's LaserFlow® sensor was installed for a test measurement purposes at the inlet of Köhlbrandhöft WWTP and outlet of Dradenau WWTP, both located in Hamburg city. The two weeks tests for each site allowed to check sensor at various flow conditions and prove its accuracy and reliability.

Site Description and Challenges

Köhlbrandhöft and Dradenau WWTPs combined have a total capacity of 1 mln m3/day, a population equivalent (PE) of 2.2 million. Both plants are managed by Hamburg Wasser Company, Northern Germany's largest public water-supply and wastewater utility. Measurement points are located on the 3-meter wide rectangular channels at the inlet of Köhlbrandhöft and the outlet of Dradenau.

Tests performed in September and November 2020 were designed to compare against existing Doppler Area Velocity sensors attached to floats (Köhlbrandhöft), and on the channel bottom (Dradenau). Higher-than-expected failure rates caused the user to consider the possibility that non-contact laser technology would be less affected by wastewater composition and fluctuations in flow.

Figure 1:Laserflow At the Final Effluent

Flow Rate Fluctuations

Flow measurement conditions on the two large channels are stable at average flow rates, but are significantly more challenging at near zero velocities (< 0.1m/s), and after high flow and storm-water events causing sudden surges. The ability to measure across the entire range was an important requirement, especially the accuracy of the data during high flow/storm-water events that is to be used for managing technological processes within the plant. The customer also wished to reduce the cost of maintaining the flow measurement system. Teledyne ISCO's non-contact laser technology was thought to be an effective way to meet all of these criteria.

LaserFlow and Signature Solution

The LaserFlow sensor was installed approximately 1 to 2 meters above the water surface in the channels at Köhlbrandhöft and Dradenau WWTPs. To ensure quick and easy installation, sensors were attached to existing structures. The non-contact laser technology allows installation and setup without interfering with the flow stream and with no need to rebuild existing channels.

The flow data was collected locally in the Signature® logger and pushed remotely via GSM communication to Teledyne ISCO's Web User Interface Flowlink® Global. Remote communication enabled the customer to keep track of readings in real time. In addition, the settings of the Signature logger can be changed via remote IP connection, resulting in lower operational costs for each site. Non-contact installation is expected to save costs in the future that would have been required for maintenance if a conventional contact measurement device were installed instead.

Measurement Results

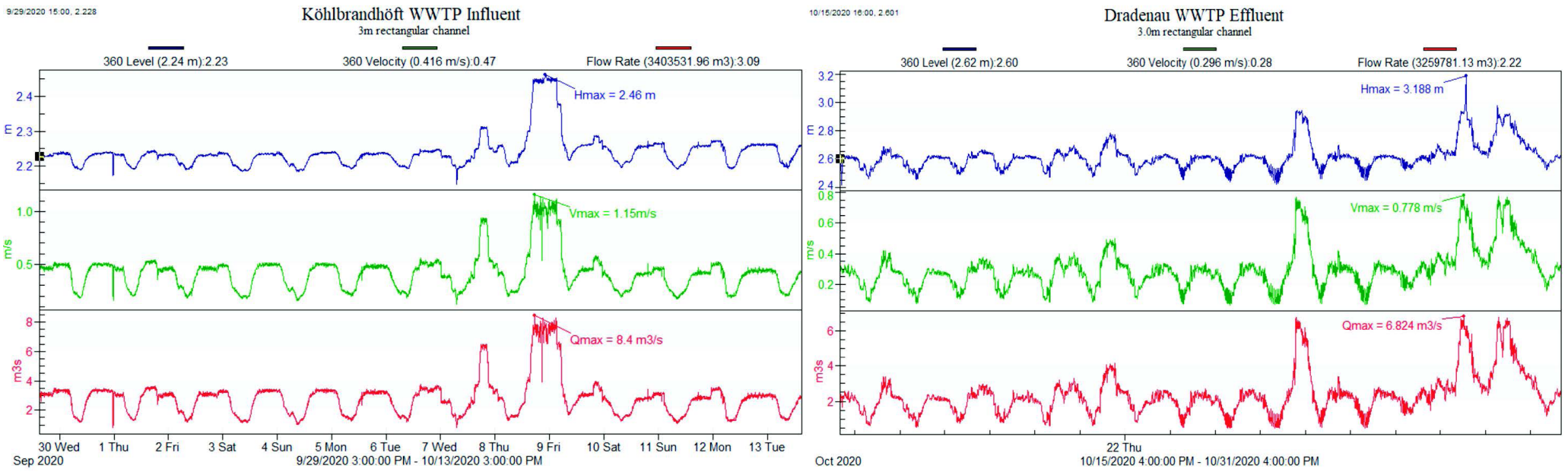
The Signature logger with TIENet® 360 LaserFlow sensor showed consistent measurement results despite challenging conditions at low velocities and high flow rate fluctuations.

Graph 1 presents the data from the Köhlbrandhöft WWTP (influent). Significant flow surges occurred twice during the measurement period, after the intensive rain events. The maximum flow peak recorded at 8.4 m3/s was more than 2.5 times higher than the average flow of 3.09 m3/s for the two-week time span. In the same period the velocity increased from around 0.6 m/s to over 1.1 m/s.

The minimum velocity in the channel could drop below 0.2 m/s at the flow rate of 1.1 to 1.5 m3/s during morning hours. This indicated possible flow condition changes between dry and wet periods, and depending on the time of day. Graph 2 presents the data from the Dradenau WWTP effluent channel. The flow peaks caused by the rain events were recorded three times during the measurement period, reaching max Q equals 6.82 m3/s, being more than 3 times the average

flow 2.22 m3/s for the whole measurement period. The velocity for all events increased from around 0.4 m/s to nearly 0.8 m/s. The velocity in this channel also tends to drop well below 0.1 m/s at flow rates between 0.5 to 1.0 m3/s.

Due to the large channel capacity, even small changes in water level can cause large increases in flow. The level changes recorded did not exceed 0.8m at Dradenau and 0.3 m at Köhlbrandhöft. The data recorded reflected conditions characteristic for such large channels on WWTPs, where flow changes might be significant in a longer period of time. The data shows the flow rate at minimum velocities can be around one third to one-half of the average flow and therefore it is critical to continuously obtain accurate readings for the near zero velocities as well.



Graph 1(Left) & Graph 2 (Right) Graph 1 shows LaserFlow measurements at the inlet of Köhlbrandhöft WWTP and Graph 2 shows LaserFlow measurements at the outlet of Dradenau WWTP

Customer's Feedback

The tests performed on the two channels on Hamburg WWTPs at various flow conditions and at different wastewater quality conditions (untreated and treated wastewater) proved high reliability, accuracy, and versatility of the LaserFlow system. As per customer opinion: "It is impressive how accurately one single non-contact sensor is able to measure the flow in a channel of such large dimension".

TIENet® 360 LaserFlow Sensor and Signature® Flowmeter

The TIENet 360 LaserFlow sensor is an area-velocity flow and water-level measurement device that remotely senses flows in open channels using non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. The sensor uses advanced technology to measure velocity with a laser beam directed at single or multiple points below the surface of the wastewater stream. Therefore, unlike radar technology, it does not require the creation of ripples on the surface of the stream.

- Zero deadband from measurement point in non-contact level and velocity measurements Continuous measurements in submerged conditions
- Advanced velocity diagnostics for data quality evaluation and analysis
- Bidirectional velocity measurement
- Low level velocity measurement

The Signature flowmeter from Teledyne ISCO, designed for open channel flow monitoring, supports flow measurement methods including bubbler, non-contact laser area velocity, ultrasonic, and submerged Doppler ultrasonic area velocity. With the ability to connect up to 9 sensors, the Signature flowmeter provides a broad range of I/O and communications options:

- pH and temperature
- SDI-12
- RS485

The Signature flowmeter is rugged (IP 66) even if the cover of the lid is open. It performs data logging with variable rate data storage and data integrity verification, and has the ability to connect a USB drive for data/report retrieval and programming.

Conferences, Events, Seminars & Studies

Conferences, Seminars & Events

2021 - 22 Conference Calendar

Due to the current international crisis there has been a large amount of disruption in the conference calendar. A lot of workshops have moved online at least in the interim and a lot of organisations are using alternative means of getting the knowledge out there such as webinars popping up at short notice. Do check your regular channels about information and events that are going on. Also do check on the dates provided here as they are the best at the time of publishing but as normal things are subject to change.

Sensor for Water Interest Group Workshops

The Sensors for Water Interest Group has moved their workshops for the foreseeable future to an online webinar format. The next workshops are

9th March 2022 - Wastewater-Based Epidemiology - Virtual
5th April 2022 - Nutrient Monitoring - Hybrid Event at Crewe Hall and online

SWAN Forum 12th Annual Conference
24th - 26th May 2022

The SWAN 12th Annual Conference – the leading, global smart water event of the year will take place 24-26 May 2022 in Washington, DC at the Washington Marriott Georgetown. This year's theme, "Connecting Innovation to Impact" will focus on the economic, social, and environmental impact of data-driven water and wastewater solutions. Our hybrid format will enable online attendees to live stream select sessions or view them on-demand.

Water, Wastewater & Environmental Monitoring
Telford, UK
12th - 13th October 2022

The WWEM Conference & Exhibition has been changed to a virtual conference and exhibition for 2021 and a physical conference and exhibition in 2022. Details on WWEM Virtual will be released in the coming months but it is sure to include huge amount of technical workshops and events for attendees to enjoy.

WEX Global 2022
Valencia, Spain
27th - 29th June 2022 - Valencia, Spain

The WEX Global Conference. Sponsored by Idrica is currently due to take place in Valencia in Spain in March 2022. The conference concentrates on the circular economy and smart solutions to resolve some of the global water industry's issues

INTERNATIONAL CONFERENCE ON

WATER, WASTEWATER & ENVIRONMENTAL MONITORING

WWEM 2021 *Virtual*

13th & 14th OCTOBER

WWEM 2022 *Live*

12th & 13th OCTOBER

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West Sussex County Council

A great source of information and networking opportunity
Environment Agency

A great event, not to be missed by anyone involved in water wastewater and environmental monitoring
United Utilities

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