WIPAC Monthly

The Monthly Update from Water Industry Process Automation & Control

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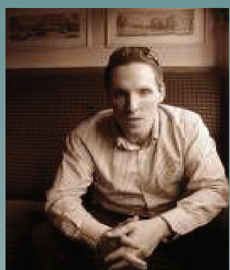

Group Count

2,970 Members

+74

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Welcome to the March Edition of WIPAC Monthly

The year so far seems to have been building more and more momentum in the world of instrumentation, automation & control. It maybe perhaps because of all of the work that the UK is doing at the moment in building the various business cases for the next Asset Management Period or maybe it is the case that I tend to live and breathe the subject that I write about and encourage that I have managed to surround myself in both my day job and within this group that all I see before my eyes is a vision where the world is controlled. This month I sat in the tender presentations for the UKWIR study on Wastewater Instrumentation and it struck me that here presenting where three very intelligent proposals to see if together we could discover where the UK water industry is going in terms of a "Smart" way forward in the operation of the Water Industry. The company that has won the project has not been decided quite yet but will be in the near future. Whichever company wins it the industry is in for exciting times moving forward.

This study is of course just the tip of the iceberg as there is the GWRC study on instrumentation also happening in parallel which also promises great things and a web portal to help practioners to make an informed decision in the way that the instruments that are our eyes & ears on the treatment works and networks are selected.

This of course is not the only thing going on as has been proved when I visited a number of supply companies this month to see their newest products. Announcements are forthcoming but what struck me is that the functionality that these products had built into them. Data loggers as standard, a micro-USBinterface and all of the information readily downloadable by simply plugging in . Other systems of course go one step further and most if not all of the systems are available through remote access via a web server. Watch this space for quite a bit of industry news next month as there is a considerable amount of instrumentation news to start the new financial year.

In other news we saw an inferential "sensor" and desludge automation win the (UK) Water Industry Achievement Awards with a product that infers the sludge thickness by the torque that the variable speed drive measures when the sludge is withdrawn. The technology developed by Inverter Drive Systems and trialled in conjunction with a UK water company was praised for its simplicity.

So to look at the future going forward and to answer a question that I have written an opinion piece for in this month's edition of whether there is a Smart Future for the Water Industry? The answer most certainly is yes but the next question is what shape will this future take. The UKWIR study might provide a direction, the technology certainly exists but the real question is how is the Water Industry going to adopt and manage it and this is where the difficulty and crux of the future lies. There have been lots of warnings over big data and my argument has always been that although data is important it is the information that gives us the real tool for managing the operation & efficiencies now and into the future. This was shown quite beautifully with the vision that Yarra Valley water saw almost twenty years ago when the started on a journey of non-revenue water reduction. Step number one—identify and monitor the problem. Step number two—analyse and interpret the data that you have. Step number three—go out and fix things. Step number 4 go to step number one and start again. What all of this shows is that the Water Industry has a very long journey ahead of it. Who fancies taking a step forward?

Oliver

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Case Study

E.Coli Pacing at Corvalis WwTP

THE COST OF COMPLIANCE: THE IMPERATIVE OF SAFETY.

Public safety is job #1, reinforced by regulatory permits, but treatment chemicals (including Cl2 and NaBs) are significant cost drivers. Historical tests for e.coli are slow, and as a result, treatment schedules build in massive safety margins to avoid accidental permit violations.

The historical dosage of Cl2 at our facility in Corvallis Oregon provided assurance of meeting permit requirements under all but catastrophic operating conditions. This level of dosing evolved over time, but was primarily the result of 'flying blind' for 24-hours while waiting for E.coli test results. Figure 1 depicts E.coli performance last October at the historic initial Cl2 residual set point of 1.0 mg/L.

De-chlorination with NaBs is used to neutralize the final effluent Cl2 residual (typically 0.4 mg/L). A NaBs residual set point of 0.3mg/L was maintained to effectively maintain a 0.00 mg/L CL2 residual under all operating conditions and control loop fluctuations. Combined, NaBs demand to neutralize chlorine, plus maintaining the desired NaBs residual, resulted in a typical applied dose rate of 0.7mg/L.

A BETTER WAY? CONTINUOUS MONITORING WITH LIQUID.

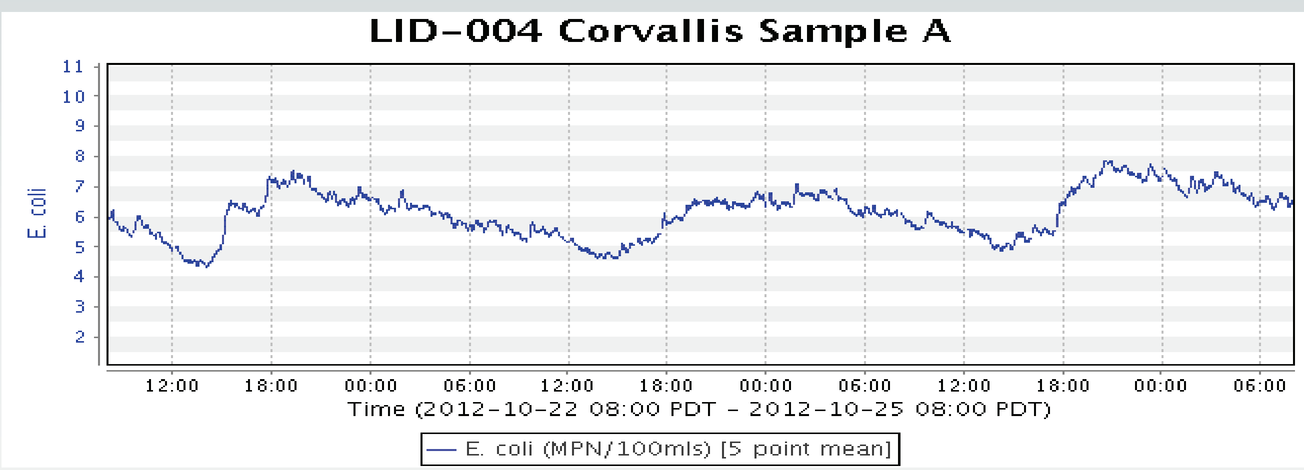
Frequent E.coli monitoring using continuous e.coli data would allow treatment dosage to be adjusted based on the actual characteristics of the wastewater stream. By treating as needed, chemical usage (both Cl2 and NaBs) could be reduced without elevating the risk of exceeding permit levels of e.coli. The LiquID Station from ZAPS Technologies features, "a unique hybrid- spectrophotometric design that uses multiple optical techniques—absorption, fluorescence and reflectance—to measure multiple water quality parameters in real time". By utilizing the high sensitivity and specificity of fluorescence measurements for e.coli detection, the automated LiquID station acts as a real-time, reagent-free process control tool to monitor E.coli in tertiary treatment streams. Corvallis WWTP was already measuring TSS, cBOD, COD, NH3, Nitrate+Nitrite and TSS using a LiquID station at our final effluent location. We took further advantage of this existing LiquID instrument by using it to also monitor E.coli concentrations in our final effluent.

CORVALLIS WWTP

The Corvallis Wastewater Treatment Plant treats an average daily flow of 9.7 mgd (37Mlpd) and handles peak flow of 30 mgd (113Mlpd).

The existing liquid treatment processes consists of an influent pump station, headworks, primary clarifiers, trickling filters (TFs), aeration basins, secondary clarifiers and disinfection (chlorination/ dechlorination).

Presently operating as a series hybrid trickling filter solids contact plant, the secondary treatment process has evolved over 50 years to be energy efficient (14 hp/mgd) and have low production of secondary solids (0.3 lb TSS/ lb BOD).



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THE PROOF IS IN THE PUDDING - VALIDATION

Corvallis WWTP is no stranger to new technologies; being in a college town (home of Oregon State University) we have ample opportunities to test technologies in development and keep an eye towards new instruments in the industry. The LiquID's would have to make continuous, accurate and dependable measurements in the field to be successful in this deployment.

Step 1: Reduced Cl2

In January, with the ZAPS LiquID successfully reporting E.coli in real time, the initial Cl2 residual was incrementally cut from 1 mg/L to 0.4 mg/L. During low flow days, and especially during low flow periods of low flow days, elevated E.coli counts became more pronounced. The events were attributed to poor Cl2 mixing during low flow periods. Moving the hypo feed location to the secondary clarifier launders for better mixing prior to measuring the initial Cl2 residual resolved the issue. This modification opened the door to further reduction in the initial dosage of hypo.

Again, the NaBs dosage was reduced to neutralize the new, lower final effluent Cl2 residual of 0.1 mg/L, and provide a NaBs residual of 0.2 mg/L. This resulted in an applied dosage of NaBs of 0.3 mg/L.

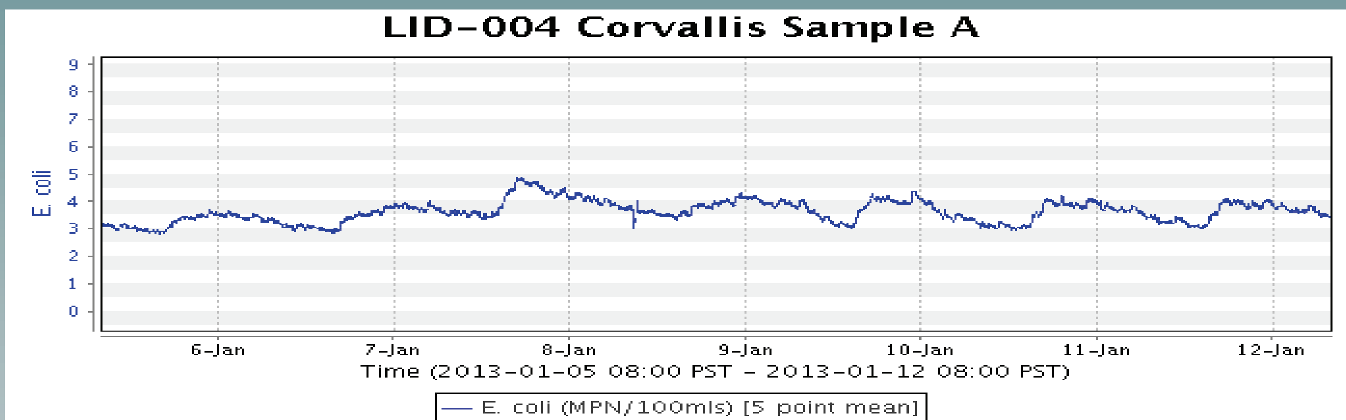

Figure 2: 6-day E.coli cycles at Corvallis, OR WWTP (01/06/2013 – 01/12/2013)

Step 2: Process Challenges and Opportunities

Later in January, the initial Cl2 set point was cut to 0.2 mg/L. As a result the effluent residual is almost always 0.00 mg/L before de-chlorination. The NaBs residual set point is 0.1 mg/l, and with no residual Cl2 demand to neutralize the typical applied dosage is 0.1 mg/L. Achieving the low dose rates was not straight forward and required new, low range Cl2 probes and NaBs analyzer recalibration to reliably measure residuals and control chemical feed rates. With further history, NaBs usage may be suspended seasonally or perhaps entirely.

The trend line below (figure 3) shows the E.coli count response to a February 21 storm event in our community which has combined sewers. The treatment plant flow had jumped from 8.4 MGD(32Mlpd) to 22 MGD(82Mlpd) in less than one-half hour.

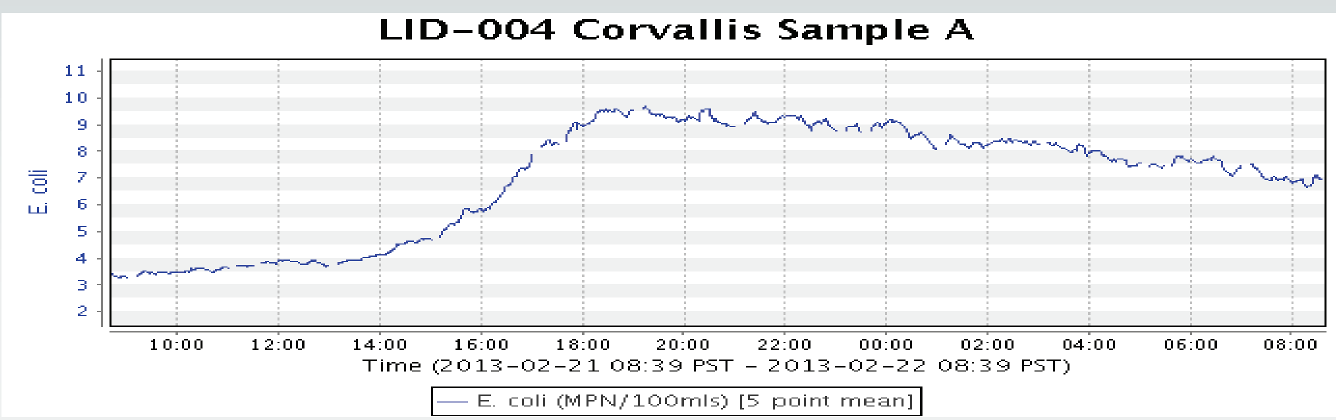

Figure 3: E.coli storm event at Corvallis, OR WWTP (02/21/2013 – 02/22/2013)

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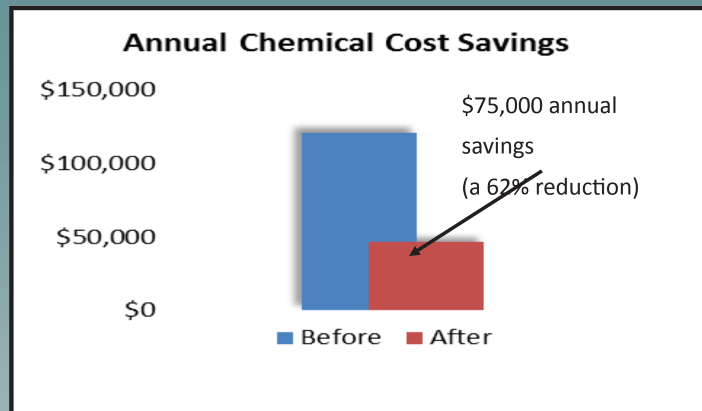
Experience using low chemical dosages has revealed yet another opportunity for chemical savings. Corvallis' two trickling filters are large for a community of 55,000 and are lightly loaded. Heavy and thorough nitrification of ammonia is encouraged during the summer months by operating the trickling filters in series. However, during the winter months the trickling filters operate in parallel mode to discourage nitrification. Previously obfuscated and hidden in the noise of much higher chemical dose rates was the chlorine demand exerted by partial nitrification of ammonia to nitrite. Low concentrations of nitrite in the secondary clarifier effluent are now observable and will more than double the applied dosage to achieve the 0.2 mg/L initial Cl2 residual set point. Under winter conditions, partial nitrification is variable and transient, for which a process control strategy to effectively prevent partial nitrification is being developed.

THE BOTTOM LINE – COST SAVINGS

Annual chemical savings from the changes to the E.coli pacing processes are currently projected to be $75,000 or 62% of the annual chemical budget. Real-time e.coli data allowed us to fit the treatment process to the actual conditions in the treatment stream while at the same time increasing the oversight of this critical regulatory parameter.

Additional saving may result from the use of ZAPS technology to control disinfection chemicals at the CSO treatment facility.



About the Author

Dan Hanthorn is the wastewater operations manager of the Wastewater Treatment Plant at the City of Corvallis in Oregon. He has worked for the city of Corvallis for the past 25 years

Industry News

Monitor effects of 'dangerous' chemicals before banning them

Water minister Richard Benyon has thrown his weight behind calls to introduce a "watch list" to assess the impact of potentially harmful chemicals in water, rather than ordering water firms to remove them as proposed by the European Commission.

Giving evidence at the Commons Science and Technology Committee's inquiry into water quality, he said developing a watch list to assess whether the chemicals were toxic in water and at what level before they were classified as a priority substance was a "sensible way forward".

"Where there is a degree of concern, certain chemicals can be put on a watch list and the rigorous process of using scientific data to inform the risk can ensue. This would allow us to make a decision on an evidence basis," he said.

He said rigorous testing of chemicals was needed before they were banned outright because of the huge cost of removing them from wastewater. The UK water industry has estimated that removing the extra substances at sewage works could cost around £27 billion over 20 years.

Benyon also criticised the Commission for not consulting member states before it published its proposed list of 15 chemicals to be listed for control.

"Having helped prepare evidence for setting the environmental quality standards, member states were not given the opportunity to review the proposal in its entirety ahead of its publication," he said. "We would have expected the Commission to take a more considered view of the practical implementations of the proposal."

Inverter Drive Systems & AWS win WIAA

An innovative way of controlling the way sludge is removed from settlement tanks was the overall winner at the Water Industry Achievement Awards at the Hilton Hotel in Birmingham this month.

The technology won both the "Most Innovative Use of an Existing Technology Award" and the "Outstanding Innovation of 2013"

The technology was developed by the Anglian Water Services Innovation Team and Inverter Drive Systems.

The system uses a standard ABB inverter to control the de-sludge pump's motor. The pump is operated at a constant speed while the built in, automatically generated motor model measures the % of maximum torque that the de-sludge pump's motor is producing. As the sludge thins, its viscosity drops, causing the torque applied to the motor to fall. If this relationship between %DS and %torque is strong enough it should be possible for the RPC to monitor the thickness of the sludge being pumped and ensure the pump stops before the sludge gets too thin. This process has been patented by the inventors, IDS.

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