

THE

CONDUIT

THE OFFICIAL PUBLICATION OF THE VIRGINIA WATER ENVIRONMENT ASSOCIATION, INC.

► SPRING 2015

Debt Refinancing: An Alternate Source of Capital

INSIDE

- JAM Preview
- Workplace Sustainability
- Turning a Pollutant into a Resource

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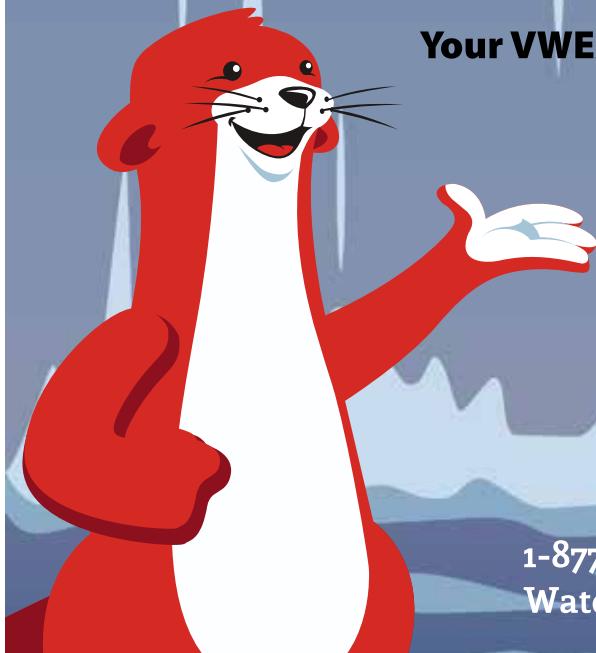
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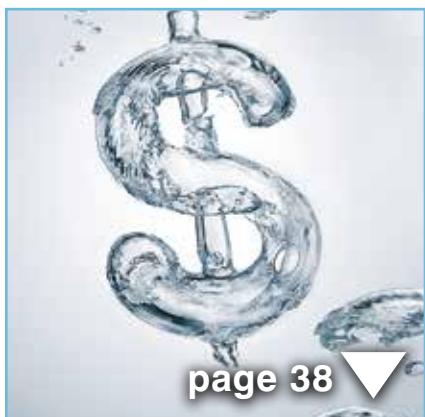
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▼ COVER FEATURE

**Debt Refinancing:
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President's Corner

Martin Malone



A Busy Season

Hello and welcome spring! Although it's that time of year to finally dust off the lawnmower and spruce up outdoors, VWEA committee members have been hard at work for months. Members organized 15 events in March and April – from the annual Stormwater Seminar and Education Conference, to Regional Activities events and YP outings. And, I hope you find opportunities in the next few months to participate, possibly at the Operations Conference or Lab Practices Conference. Looking ahead to JAM2015, the committee has planned a robust program of education and training sessions and pre-conference workshops. See pages 52-53 of this issue for details, or visit www.vwea.org.

VWEA also recently hosted the 2015 WEFMAX Meeting, a quick but impactful two-day session bringing together WEF leaders and state-level leaders from all over the U.S. The WEF Member Association Exchange allows for idea sharing and discussions to take back and improve our organizations. The WEFMAX planning committee (led by Lora Reed, Shawn Hesselton and Kathy Rabalais) did a great job hosting the 65 attendees, as did the following speakers, who shared some of VWEA's successes:

- **Staying Financially Sound**
– Greg Everhart
- **Student Chapter Development**
– Lauren Zuravnsky
- **Collaboration with other Organizations**
– Stacie Metzler

Another area VWEA board members have been busy planning for is the launch of AMS, Association Management Software – a communications platform to facilitate a new website, event registrations, membership database and more. The VWEA Board of Directors is working with a third-party provider, YourMembership.com, to convert over to the new platform, along with adding several new features. I'm excited for the benefits this will provide to members, such as:

- Online registration for all events, including regional activities lunch and learns.

- Committee networking enabling group collaboration with access to minutes and rosters.
 - Mobile-friendly website viewing.
- Equally important, the new platform will offer cost savings and will streamline everyday management of the association. We're planning a roll out this fall, so stay tuned for additional updates.

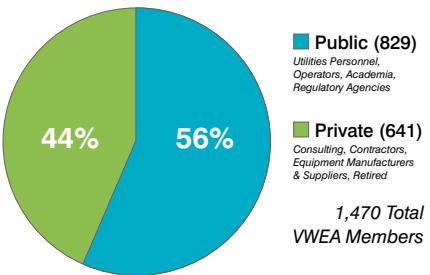
Another new addition, starting with this version of *The Conduit*, is a dedicated **WEF Corner** section to include a technical topic on the national level. In this edition, we are sharing two articles with you; one on natural gas fracking and one on *nutrient removal and recovery at WRRFs*. It's great to have additional technical content for our readers, and please feel free to share your own article or project highlight by e-mailing Felicia Glapion, Editor, at Conduit@vwea.org.

Did you know?

Speaking of member engagement and membership benefits, **44% of VWEA members are from the private sector and 56% are from the public sector.**

This balance between private and public sectors is one reason why members come to our events and allows for "face time" with people they do business with. It also demonstrates a shared commitment to Virginia's water quality industry from both the public and private sector. If you agree, then I'm asking you to also promote VWEA in this light, when, say, encouraging someone new to come to an event or join the organization. Now back to mowing and enjoying spring! ☺

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WORKPLACE SUSTAINABILITY

Small efforts combine to create a positive impact

By Christel Dyer (HRSD), Laura Kirkwood (HRSD)

As water quality professionals, we work hard to improve the world around us by designing cutting-edge treatment facilities and stormwater basins, and operating and maintaining these facilities to meet stringent water and air regulations. We aim for energy and chemical efficiency as a means of budgetary success. This resource conservation also reduces our net impact on the environment. So, how often do we think about our impact on the environment in our day-to-day actions while at work? As long as we are thoughtful about how our actions impact the environment, we can begin to make small improvements. There are a variety of efforts we can take: recycling; using recycled products, green chemicals, and green cleaning products; teleworking; updating light fixtures; switching to hybrid vehicles; and the list goes on! For the sake of sanity and time, we will only go into detail on a few of the topics.

RECYCLING

According to *Forbes*, Virginia ranks 23rd as a green state; this is not an impressive statistic. As a state, we have a long way to

go to improve our ranking. According to Virginia's Department of Environmental Quality (DEQ), the recycling rate for Virginia in 2013 was 41.2%. Many of us have the opportunity to recycle at home, but this may not be available while at the office. If recycling is not available at your workplace, find out if curbside pickup or a large recycle container pickup is available from your locality or local recycling company. If not, find out what effort it would take to drop materials off at a recycling center. Encourage your co-workers to recycle and make sure that only recyclable materials, as designated by your recycling center, make it into the recycle bins. If you already recycle at work, awesome!

Recycling should also be made available for batteries, plastic bags and wrap, light bulbs, and ink cartridges. All of these items require additional effort to recycle, so someone from your workplace will have to take the lead on setting up the appropriate recycling stations and make sure the collected materials make it to the appropriate recycler.

OTHER SUSTAINABILITY INITIATIVES

Other than recycling, there are a number of other small changes that can be made to reduce the impact your workplace has on the environment. Look into energy conservation ideas and get buy-in from your co-workers. Discuss green purchasing where possible with your purchasing group. Advertise your efforts to the public and encourage your co-workers to take these sustainable initiatives home.

HRSD'S INTERNAL SUSTAINABILITY ADVOCACY GROUP (SAG)

In 2008, HRSD (Hampton Roads Sanitation District) developed an internal Sustainability Advocacy Group (SAG) to look into how the organization could reduce the net impact on the environment. The team has been highly successful in improving employee environmental awareness both at home and at work. To date, the sustainability team at HRSD has provided recycling at all work centers, to include plastic bags, batteries, light bulbs, ink cartridges, tires, laboratory chemical/sample containers

FUN FACTS:

1. On average, over a lifetime, a typical American will throw away 600 times his or her adult weight in garbage. This means that each adult will leave a stamp on the environment of 90,000 pounds of trash for future generations.
2. Plastic bags are the second most common trash item found in the ocean; cigarette butts are first.
3. In the United States, we use roughly 6 billion plastic bags a year, with each bag taking 1,000 years to break down.
4. One ton of 100% recycled paper saves the equivalent of 4,100 kWh of energy, 7,000 gallons of water, 60 pounds of air emissions, and three cubic yards of landfill space.
5. Office buildings use approximately 19% of all energy consumed in the United States.
6. Heating, ventilating and air conditioning systems account for 40-60% of total energy use in the commercial sector.
7. For additional facts, visit Boston College's Sustainable Facts Page.



HRSD plastic bag recycle bin



HRSD quarterly newsletter



Single stream recycle bin

and pipettes, and single stream recycling of plastic bottles, metal cans, glass containers, paper, and cardboard. HRSD has also created a teleworking program, encouraging employees to work from home on scheduled days to reduce their carbon footprint. A printing policy, which includes using recycled paper and setting the default setting to double-sided printing, was also instituted to reduce the amount of paper used by staff. HRSD is currently conducting the first annual One Thing Challenge, where employees have been asked to give up their office trash

cans to further improve overall single stream recycling efforts. The SAG creates and provides a quarterly newsletter to employees, which is made available to the public on HRSD's website, HRSD.com.

It may not require a sustainability team to help your work center reduce its impact on the environment, but it's time to get started on making small changes now for future generations! Share your ideas and sustainable initiatives with the Sustainable Utilities Committee by e-mailing committee chair Denise Nelson at nelson@sustainableinfrastructure.org. ☺

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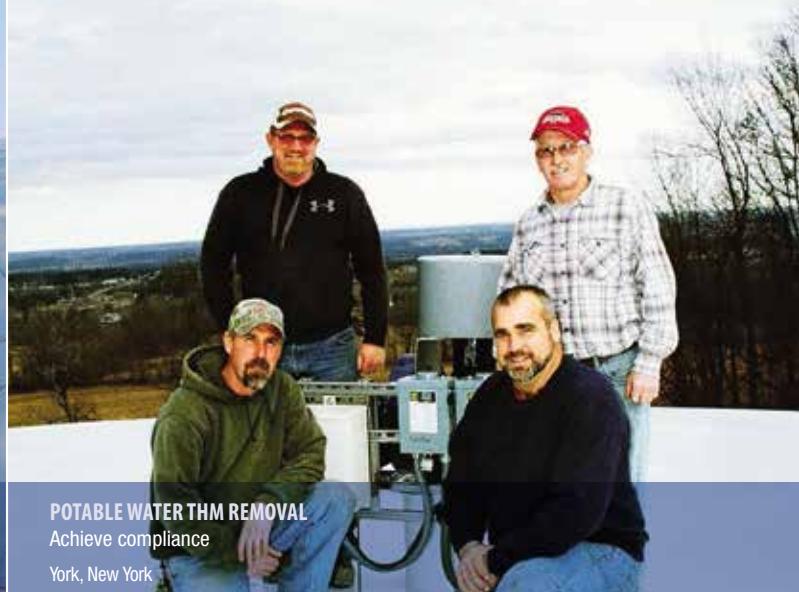
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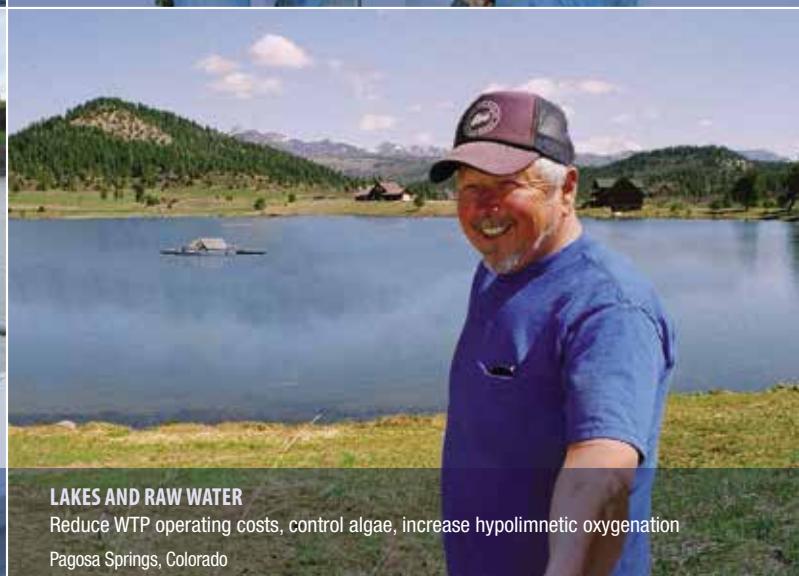
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4th Annual Wastewater Operations Education Conference & Operations Challenge Competition

JULY 15-17, 2015
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Mark your calendars for the 4th Annual Wastewater Operations Education Conference and Operations Challenge Competition July 15-17, 2015 at Wintergreen. This year VWEA will be partnering with AWWA for a conference that is sure to include something for every water professional.

- The conference kicks off on July 15 with our wastewater workshop from 1-5 p.m. 3.5 potential CPEs will be available for participation in this workshop.
- The Operations Challenge Competition will be held on July 16. Last year the Division 1 champions, Terminal Velocity, made an impressive showing; will a new team give them a run for their money in 2015?
- AWWA will be providing a water education track that will run concurrently with the operational challenge competition. 6.0 potential CPEs will be available for participation in these lectures.
- There will be three education tracks held on July 17, with a common track for both water and wastewater professionals. 6.0 potential CPEs will be available for participation in these lectures. Make sure you take advantage of these dual water and wastewater credits! ☺

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Should Your Facility Accept Fracking Wastewater?



By Elizabeth Conway, Committee Coordinator, Water Environment Federation econway@wef.org



Hydraulic fracturing, commonly referred to as fracking, is conducted at shale formation locations throughout the United States to increase production of natural gas. The fracking process requires a large amount of water (flowback, production, and drilling) thereby producing wastewater that must be either disposed of, stored, or treated. Due to the constituents contained in the wastewater, treatment poses problems for water resource recovery facilities (WRRFs). Several considerations and preparations should be made by a WRRF prior to accepting such wastewater.

NON-TYPICAL WASTEWATER POLLUTANTS

The largest concern for WRRFs is typically the high salinity of fracking wastewater, measured in total dissolved solids (TDS). In addition, fracking wastewater can contain high levels of fluid additives, metals, and naturally occurring radioactive materials. The constituents are often at levels not typically found in WRRF influent.

Fracking wastewater quality can vary significantly, depending on pretreatment, if any. It is also important to know the volume, frequency, and delivery method of the material. A clearer picture of these constituents and characteristics can be obtained by enrolling the fracking operation in an industrial influent management program. Through such a program, the WRRF should be able to control the receipt of fracking water by setting pretreatment quality specifications.

REGULATIONS FOR FRACKING WASTEWATER

States and the U.S. Environmental Protection Agency (EPA) share responsibility for regulating treatment and disposal of wastewater from shale-gas extraction under National Pollutant Discharge Elimination System (NPDES). In October 2011, EPA announced a schedule to develop categorical effluent standards for wastewater discharges produced by natural gas extraction from underground

coal-bed and shale formations. EPA will publish the Final 2014 Effluent Guidelines Program Plan after incorporating feedback gathered during the public comment period, which ended November 2014.

Several states have developed or will be developing their own rules for the acceptance of fracking water at WRRFs (see <http://www2.epa.gov/hydraulicfracturing>). Some state regulators are also imposing new regulations on WRRF discharges to protect aquatic organisms and drinking water purveyors from excess concentrations of effluent constituents such as TDS in receiving waterbodies.

Each WRRF should discuss current NPDES requirements and other regulations for accepting water from fracking operations with its state regulatory agency and EPA before accepting fracking wastewater to ensure that the latest regulatory requirements (such as permitting, additional monitoring, and effluent discharge limits) are identified. Also, it is best to engage the regulatory community as soon as possible in an open discussion of the current and planned regulatory requirements for fracking wastewater treatment at a WRRF.

CONFIRM WRRF'S ABILITY TO TREAT WASTEWATER

Once a WRRF understands potential influent constituents and what is needed to achieve consistent compliance with its NPDES permit, the WRRF should carefully review its ability to continue optimal operations with additional loading. The WRRF should review control processes and understand the potential impact of fracking wastewater on the facility, and in particular, the stability of operations in light of projected salt levels and concentration variability. Also to be considered are potential changes on the biosolids quality due to constituents that are removed from the liquid stream.

MORE RESOURCES AVAILABLE

In summary, prior to accepting fracking water at a WRRF, four steps should be followed:

- Determine the fracking wastewater constituents, volume, frequency, and proposed delivery method.
- Determine the type of pretreatment the fracking water has undergone.
- Discuss NPDES requirements and other regulations with the state regulatory agency and EPA.
- Consider the effects on both final effluent quality and biosolids.

For more information, download the fact sheet *Considerations for Accepting Fracking Wastewater at Water Resource Recovery Facilities*, which discusses in further detail each of the four steps listed above, definitions, and quantitative data as well as references and links to more information.

The information provided in this article is designed to be educational. It is not intended to provide any type of professional advice including without limitation legal, accounting, or engineering. Your use of the information provided here is voluntary and should be based on your own evaluation and analysis of its accuracy, appropriateness for your use, and any potential risks of using the information. The Water Environment Federation (WEF), author and the publisher of this article assume no liability of any kind with respect to the accuracy or completeness of the contents and specifically disclaim any implied warranties of merchantability or fitness of use for a particular purpose. Any references included are provided for informational purposes only and do not constitute endorsement of any sources. ☐

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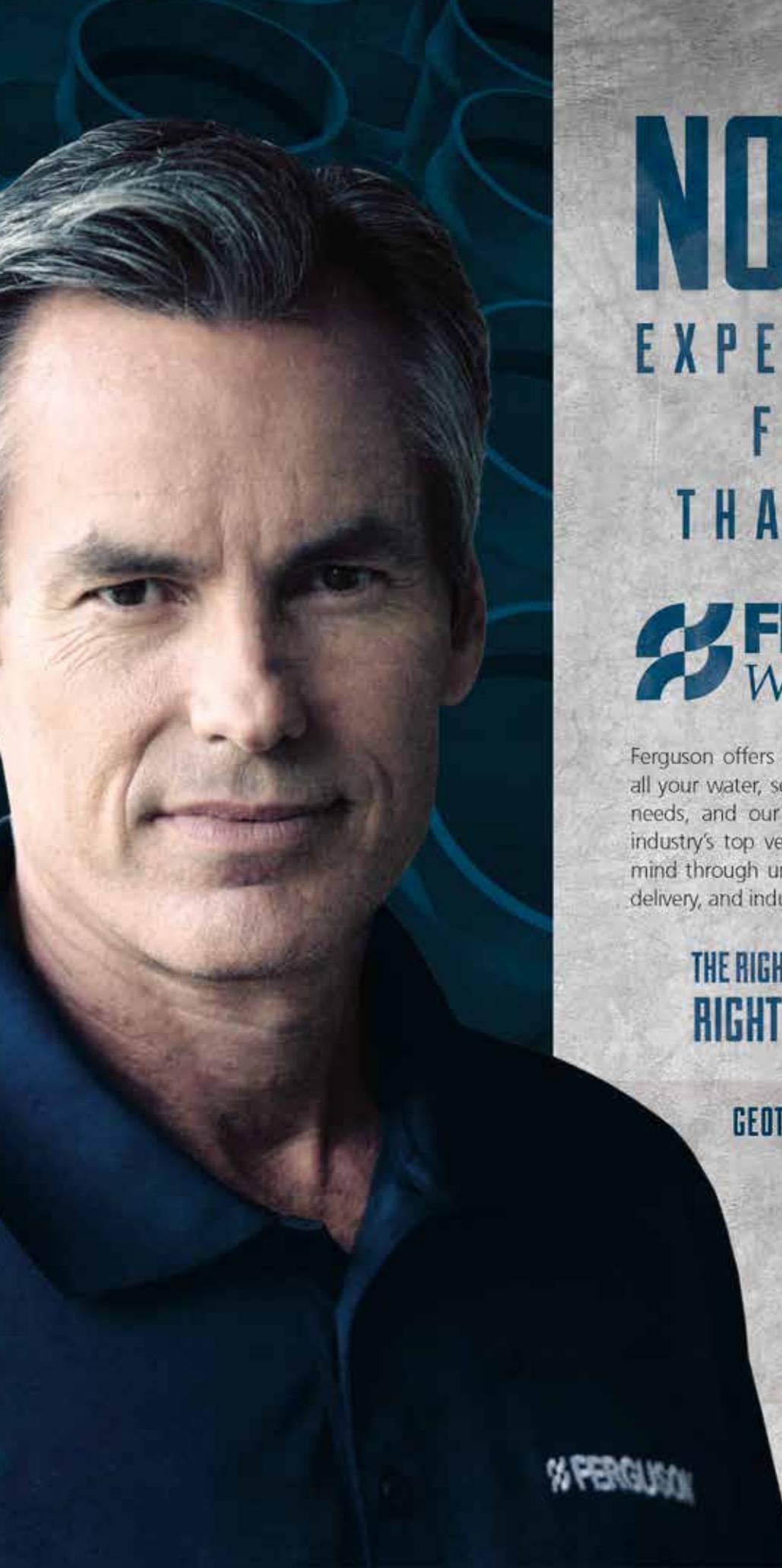
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Turning a Pollutant Into a Resource

An overview of nutrient removal and recovery at WRRFs



By Barry Liner, Ph.D., RE., is director of the Water Science & Engineering Center at the Water Environment Federation (WEF) Water Science & Engineering Center. Sam Jeyanayagam, Ph.D., PE., BCEE, is chair of the WEF Nutrient Roadmap publication task force.

In excess, nutrients can be harmful water pollutants. Nutrients are found in agricultural and home fertilizers as well as agricultural operations. Sources include confined animal feeding operations, industrial pretreatment facilities, septic systems, and water resource recovery facilities (WRRFs) as well as municipal and industrial stormwater runoff.

According to the U.S. Environmental Protection Agency (EPA), more than 100,000 mi² of rivers and streams, close to 2.5 million ac of lakes and ponds, and more than 800 mi² of bays and estuaries are affected by nitrogen and phosphorus pollution. Excess nutrients can lead to algal blooms, which can produce toxins and result in hypoxic zones. Algal blooms cost the tourism industry some \$1 billion annually, according to EPA. These substantial impacts are the reason regulatory nutrient limits are expanding across the country.

NUTRIENT REMOVAL AT WRRFS

Nutrient management begins with nutrient removal to meet permit requirements. WRRFs can achieve very low nutrient discharges through a variety of processes, primarily biological nutrient removal (BNR), physical separation, and chemical methods. Most technologies capable of removing both nitrogen and phosphorus utilize BNR, which relies on bacteria to transform nutrients present

in wastewater. In BNR, bacteria are exposed to the influent from primary treatment. The selection of a BNR process should be based on influent flow and loadings, such as biochemical oxygen demand (BOD), nutrient concentrations, and other constituents as well as target effluent requirements.

Mainstream nutrient treatment takes place within the typical plant process flow. However, *sidestream treatment* refers to liquid resulting from biosolids treatment (anaerobic digestion and dewatering) that is intercepted with an additional treatment goal – to remove nutrients from a concentrated stream

and minimize mainstream impacts. Like mainstream nutrient treatment processes, sidestream treatment can also vary from biological to physical and chemical removal methods.

NITROGEN REMOVAL

Nitrogen can be removed from wastewater through physiochemical methods, such as air-stripping at

Select species of bacteria can accumulate phosphorus, while others can transform nitrogen, and a few can do both. Achieving significant reductions in both nitrogen and phosphorus requires careful design, analysis, and process control to optimize the environment of nutrient-removing organisms. The uptake of nutrients and growth of microorganisms could be inhibited by a limiting nutrient, available carbon, or other factors, including oxygen levels.

Some nutrient removal systems rely on two separate processes for nitrogen and phosphorus removal. In some cases BNR is used to remove the majority of nitrogen and phosphorus, and then chemical methods are used to further reduce phosphorus concentrations.

high pH, but it is more cost-efficient to use BNR. Conventionally, this method utilizes the natural nitrogen cycle, which relies on ammonia-oxidizing bacteria to transform ammonia into nitrites (NO₂⁻) after which nitrite-oxidizing bacteria form nitrates (NO₃⁻) – a process called *nitrification*. Other species of bacteria can transform these compounds into nitrogen, a harmless gas (N₂) – a process called *denitrification*. Nitrification can occur in the aeration basin together with BOD oxidation as they both require aerobic conditions. In contrast, denitrification takes place in an anoxic reactor with the nitrate providing the required oxygen. As denitrification occurs, nitrogen gas is produced and released safely into the atmosphere, where nitrogen gas is more



Nutrient removal is an essential part of wastewater treatment to help prevent algal blooms, as shown in this 2011 satellite photo of an especially severe case in Lake Erie.

Credit: MERIS/NASA; processed by NOAA/NOS/NCCOS

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abundant than oxygen. Nitrogen gas is inert and does not pollute the atmosphere.

When performing biological nitrogen removal, it is important that the activated sludge has enough available carbon to sustain denitrification. The bacteria that mediate denitrification need carbon to build new cells as they remove nitrogen. This means that utilities must make decisions on how best to use the carbon for the combinations of nutrient removal/recovery, energy generation, and/or recovery of value-added nonnutritive products.

The nitrogen removal rate is also dependent on the amount of time that sludge spends in the reactor (solids retention time), the reactor temperature, dissolved oxygen, pH, and inhibitory compounds. Optimal conditions differ for nitrification and denitrification, but both can be carried out simultaneously in the same unit if anoxic and aerobic zones exist. Some process configurations, such as oxidation ditches and sequencing batch reactors, combine nitrification and denitrification within a single tank while others incorporate two separate stages. Nitrogen removal processes can also be broken down into two categories based on whether bacteria are suspended within the wastestream or fixed to media. Examples include integrated fixed film activated sludge (IFAS) and denitrification filters.

A method of nitrogen removal that has gained favor over the past decade is deammonification, a two-step process that avoids nitrate formation. Aerobic ammonia oxidation to nitrite occurs in the first phase, then nitrogen gas is produced through anaerobic ammonium oxidation (also known as Anammox). Anammox is a biological process carried out by specialized bacteria that oxidize ammonia, and nitrite is used as an electron acceptor (oxygen source) under anaerobic conditions.

PHOSPHORUS REMOVAL

Unlike nitrogen, phosphorus cannot be removed from wastewater as a gas. Instead, it must be removed in particulate form through chemical, biological, hybrid chemical-biological processes, or nano-processes. Nano methods involve membranes and include reverse-osmosis, nanofiltration, and electrodialysis reversal. Chemical methods (chem-P) typically

utilize metal ions, such as alum or ferric chloride. These compounds bind with phosphorus and cause it to precipitate and be removed by sedimentation and filtration. Chemical methods are influenced by a number of factors including the phosphorus species, choice of chemical, chemical-to-phosphorus ratio, the location and number of feed points, mixing, and pH.

Enhanced biological phosphorus removal (EBPR or bio-P) relies on phosphorus-accumulating organisms (PAOs) capable of removing phosphorus in excess of metabolic requirements. While many factors impact the EBPR process, the two most important requirements are availability of a readily biodegradable carbon source (food) and cycling of the PAOs between anaerobic and aerobic conditions. In the anaerobic zone, PAOs take up and store carbon. The energy required for this is obtained by releasing internally stored phosphorus. In the subsequent aerobic zone, the stored carbon is assimilated and the energy is used to uptake excess phosphorus.

Consequently, the design and operation of EBPR systems must consider the availability of a readily biodegradable carbon source (such as volatile fatty acids) and the integrity of the anaerobic zone by eliminating dissolved oxygen and/or nitrate contributions from the influent, return streams, and backflow from the downstream aerobic zone. As with biological nitrogen removal, oxygen levels, solids retention time, and temperature play an important role in EBPR efficiency. It is common practice to add a standby chemical system to account for poor EBPR performance. Many existing biological nitrogen removal processes can be modified to remove phosphorus by adding an anaerobic phase.

However, economic and environmental trade-offs exist, such as greenhouse gas production in the form of nitrous oxide as well as increased energy demands. Nutrient removal techniques can also affect biogas production and dewatering. The dewatering process is negatively affected by bio-P. During anaerobic digestion, flow from the bio-P process can decrease the efficiency of dewatering and require additional polymer as a coagulant, particularly when there are fewer beneficial metal ions, such as iron and aluminum.

“Beyond simply removing nutrients, WRRFs also can reclaim nutrients. Recovery not only prevents nutrients from entering waterbodies but provides a supply of these essential resources.”

FROM REMOVAL TO RECOVERY

Beyond simply removing nutrients, WRRFs also can reclaim nutrients. Recovery not only prevents nutrients from entering waterbodies but provides a supply of these essential resources. The most straightforward way of recovering nutrients is through biosolids. EPA estimates that the approximately 16,000 WRRFs in the United States generate about 7 million tons of biosolids. About 60% of these

biosolids are beneficially applied to agricultural land, with only 1% of crops actually fertilized with biosolids. However, generating solid fertilizer from biosolids is the most common method of nutrient recovery from wastewater.

Wastewater operations that have adopted the principles of becoming a utility of the future are using the nutrient removal process to produce marketable products beyond simple biosolids,

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including nutrients, energy, electricity, and vehicle fuels. Phosphorus used for fertilizer is a finite resource, with some estimating that demand will outpace supply within the next century. In a similar vein, ammonia is produced via the Haber-Bosch process, which consumes natural gas (a nonrenewable resource), is an energy-intensive process, and is associated with greenhouse gas emissions. Interest in recovering nutrients from wastewater has increased over the last decade. However, the maturity of nutrient recovery technologies varies, and each has its advantages and disadvantages.

Sidestream treatment of sludge and sludge liquor, where nutrients are more concentrated, is generally the preferable target for nutrient recovery, but resource recovery complexity can vary widely depending on local conditions. In addition to nutrients, there are other types of products that can be recovered, such as metals, heat, and potable or drinking

water, which may bring financial rewards and benefits to help offset utility costs.

These are some nutrient-based and other resources that can be recovered at a WRRF:

- Solid fertilizer from biosolids
 - Land application of biosolids recycles nitrogen, phosphorus, carbon, and other macronutrients.
 - Soil blends and composts are potential phosphorus recovery products.
 - Incinerator ash is also a source of phosphorus for recovery.
- Solid fertilizer from the treatment process
 - Struvite precipitation and recovery: By this method, both phosphorus and ammonium can be simultaneously recovered, producing a high-quality fertilizer from some sidestream systems.
 - Other methods of phosphate precipitation such as brushite are also becoming common.

- Water reuse
 - Irrigation with reclaimed water can have some nitrogen and phosphorus benefits.
- Chemical recovery
 - Structural materials can be obtained from carbonates and phosphorus compounds.
 - Proteins and other chemicals, such as ammonia, hydrogen peroxides, and methanol, can be recovered.
 - Solids can be stored for future mining.

A ROADMAP TO NUTRIENT RECOVERY

With the complexity of nutrient removal and recovery alternatives available, utility staff may wonder how to move forward to address current needs or plan for future impacts of nutrient limits. The Water Environment Federation has released a *Nutrient Roadmap* to support the movement toward smarter and sustainable nutrient management in the context of each WRRF's specific regulatory climate and stakeholder preference. The *Roadmap* provides a straightforward, high-level framework for planning, implementing, and evaluating different steps of a net-zero nutrient discharge strategy and can be found at www.wef.org/nutrientroadmap. ☐

Note: The information provided in this article is designed to be educational. It is not intended to provide any type of professional advice including without limitation legal, accounting, or engineering. Your use of the information provided here is voluntary and should be based on your own evaluation and analysis of its accuracy, appropriateness for your use, and any potential risks of using the information. The Water Environment Federation (WEF), author and the publisher of this article assume no liability of any kind with respect to the accuracy or completeness of the contents and specifically disclaim any implied warranties of merchantability or fitness of use for a particular purpose. Any references included are provided for informational purposes only and do not constitute endorsement of any sources.



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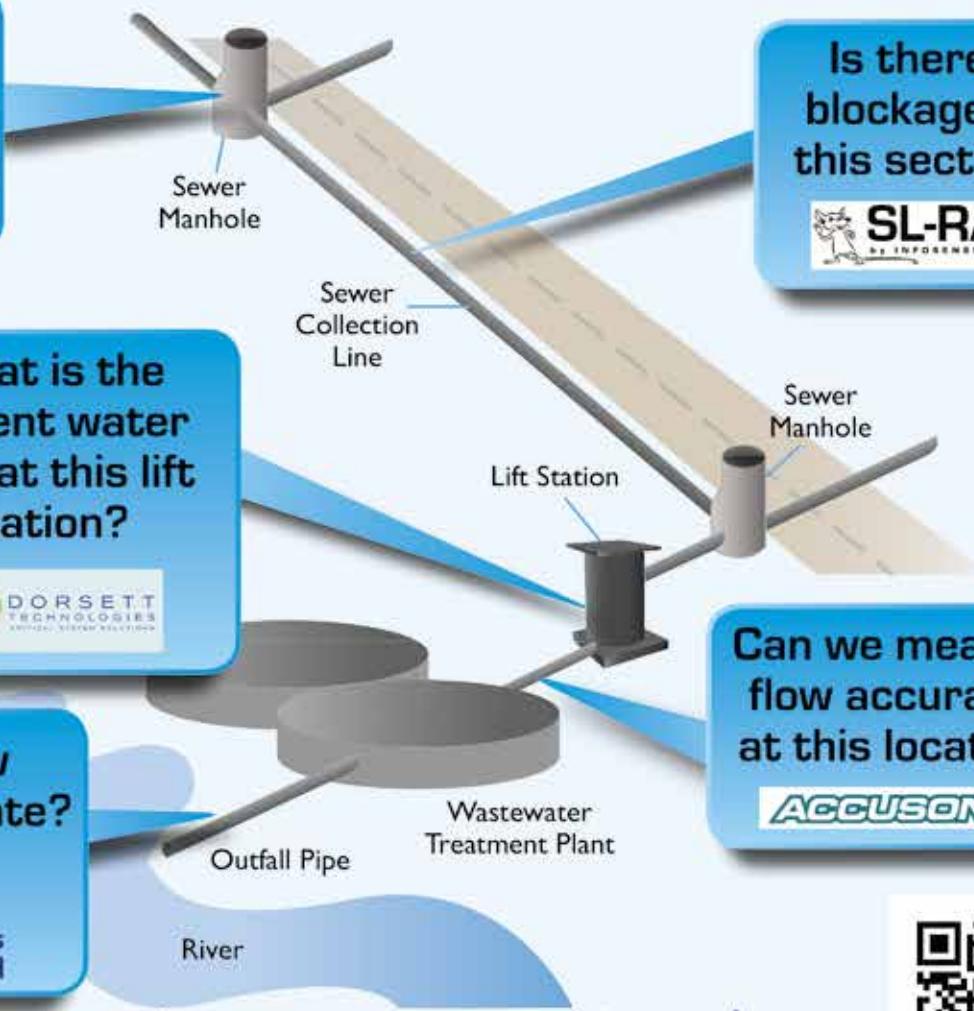


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VWEA 2015

Virginia General Assembly **UPDATE**

By Public and Government Affairs Committee

The 2015 short, odd-year Virginia General Assembly session included a steady stream of water-related legislation of interest to VWEA members. In particular, legislation introduced this session focused on issues related to water resources, groundwater withdrawal permitting, toxic chemical storage, biosolids and industrial waste, and stormwater utilities. Although finances in the Commonwealth are tight, Governor McAuliffe's proposed budget amendments and the General Assembly's subsequent amendments to the Governor's proposal include water quality funding for the stormwater and agricultural sectors. A summary of select legislation addressed during the session follows. At the time this article was being drafted, all items were still under review by the Governor.

Joint Legislative Audit and Review Commission to study water resources

The General Assembly approved legislation (HJ 623 – Hodges / SJ 272 – Norment) requiring the staff of its oversight agency, the Joint Legislative Audit and Review Commission (JLARC), to study Virginia's water resource planning and management. The study will focus on groundwater, but will also address surface water to determine if current consumption rates are sustainable, as well as assess the potential effects of overconsumption. The study will examine the current permitting programs for surface water and groundwater withdrawals, consider issues related to funding and staffing of state agency water staff, and consider the need for long-term preservation strategies to ensure adequate surface water and groundwater are available for future consumption. JLARC will receive technical assistance from the Department

of Environmental Quality (DEQ), the State Water Control Board, and the Virginia Department of Health, as well as from local governments and water resource authorities upon request. JLARC will produce an executive summary of its findings by the first day of the 2016 General Assembly session.

Eastern Virginia Groundwater Management Advisory Committee

The General Assembly passed legislation (HB 1924 – Hodges/SB 1341 – Norment) creating the Eastern Virginia Groundwater Management Advisory Committee to assist DEQ in developing, revising, and implementing a management strategy for groundwater in the Eastern Virginia Groundwater Management Area. The committee will be comprised of stakeholders from a broad range of disciplines. The committee will examine a variety of issues such as alternative

water sources, analyzing water demand, alternative management structures such as trading, and potential future water permitting criteria. The committee will present its recommendations to the State Water Commission and the DEQ Director by August 1, 2017. DEQ will then issue a report to the Governor, State Water Commission, and General Assembly responding to the committee's recommendations by November 1, 2017. Finally, the legislation prohibits DEQ from issuing draft permits that would require reductions in permitted volumes of ground water withdrawals prior to December 31, 2015.

Toxic Chemical Advisory Committee

In the wake of several high profile spills in Virginia and surrounding states, the General Assembly passed legislation (SB 811 – Watkins) to establish a toxic chemical advisory committee. The legislation requires DEQ, the State Health Commissioner, and the State Coordinator of Emergency Management to evaluate Virginia's existing laws and regulations for ensuring that chemical storage in the Commonwealth is conducted in a manner that is protective of human health, public safety, drinking water resources, and the environment. The legislation is intended to address issues related to bulk chemical storage. The committee will address a broad range of issues with an emphasis on the protection of drinking water sources. The legislation adopts the definition of chemicals from the *Superfund Amendments and Reauthorization Act* (SARA) and the *Emergency Planning*

and Community Right-To-Know Act (EPCRA). The committee must report their findings to the General Assembly and the State Water Commission by December 1, 2016.

New tonnage fee for Class A Biosolids

Finally, Governor McAuliffe's budget included language authorizing the DEQ to establish a fee for producers of Class A Biosolids of \$3.75 per dry ton of exceptional quality biosolids cake sewage sludge that is land applied beginning October 1, 2015. Currently, DEQ charges \$7.50 per dry ton of land-applied Class B Biosolids, but nothing for Class A biosolids. The Class A fee will help DEQ maintain a strong and successful field presence for inspections and public complaint responses, even as more wastewater treatment plants move to a Class A product.

Land application of industrial residuals

The General Assembly approved legislation (HB 1364 – Peace/SB 1413 – Dance) that will create an option for localities to adopt ordinances providing for the testing and monitoring of land application of industrial residuals. A similar local monitoring option for biosolids land applications is already provided for in State Code at Va. Code § 62.1-44.19:3(l). The legislation creates a local monitoring program for industrial residuals that mirrors the current biosolids monitoring option. The legislation requires the State Water Control Board to adopt emergency regulations to govern the program, as well as a \$5 fee for each dry

ton of solid or semisolid industrial waste that is land applied, which is similar to the fee charged by localities with local ordinances for biosolids monitoring.

General Assembly interest in stormwater utilities continues

The General Assembly continues to have interest in stormwater utility charges, which have sparked some controversy over the past few years. Again this year, controversial legislation was introduced to exempt property owned by certain churches, religious associations, or denominations from stormwater fees. This year's bill, HB 1293 (Morris), sought to exempt these religious groups from payment of stormwater utility fees as well as stormwater land-disturbance permit fees. The bill failed to pass the House. The General Assembly passed legislation requiring the State Water Control Board to make dredging operations a creditable practice for meeting Chesapeake Bay requirements once the Chesapeake Bay Program approves such practice. The legislation, SB 1201 (Wagner), also requires any locality in the Lynnhaven River watershed (i.e., Virginia Beach) to use stormwater fee funds for dredging where stormwater has contributed sediment deposition.

Grant funding

This session the General Assembly added \$5 million to the Stormwater Local Assistance Fund (SLAF) and an additional \$10.7 million in general funding in FY 16 for Agricultural Best Management Practice Cost Share & Tech Assistance programs. ☺



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How one Virginia utility is making healthcare more accessible to its employees

With excellent benefits and a positive work environment, the Prince William County Service Authority does its best to keep its nearly 300 employees happy and healthy.

Last year, the Northern Virginia-based water and wastewater utility began offering a program called LiveHealth Online, a new healthcare option for employees that makes doctor "house calls" a virtual reality. Sponsored by WellPoint/Anthem, the program allows Service Authority personnel to speak to a physician online 24 hours a day, seven days a week. All you need is a PC, tablet or smart phone equipped with a camera.

The first visit is free for employees using an online coupon, and any subsequent visit costs a standard co-payment if they are covered through one of the Service Authority's healthcare plans. If not, it's just \$49 – cheaper than visiting the Emergency Room and often cheaper than visiting an Urgent Care Center.

Service Authority Human Resources Director Theresa O'Quinn called LiveHealth Online "a cutting-edge approach to

providing healthcare to our employees, dependents and retirees."

"The Service Authority cares deeply for the health and well-being of its employees and their families," said O'Quinn. "We are happy to provide them with the choice of immediately accessing a primary care physician from the comfort of their own home or office."

Between the Service Authority, Prince William County Public Schools and Prince William County government, a total of 21 employees used the service in 2014 – 16 of them through a mobile device. The average length of the visit was just over seven minutes long and the average member rating of the program was a five out of a possible five.

Graphic designer Amanda Clark was one of the first Service Authority employees to take advantage of the program, consulting a primary care physician based in the Minneapolis suburbs for a sinus infection. Her experience with Dr. Sandy Wiita was terrific, said Clark.

"From the aspect of seeing and experiencing a doctor's bedside manner, I think having this program is comforting if you don't feel good," Clark said.

PROGRAM ORIGINS

According to Spencer Milus, the Sales Director for LiveHealth Online, the idea was hatched after seeing the results of the Massachusetts healthcare plan launched in 2006. After a few years, patients were waiting twice as long to see a doctor for health issues like sinus infections as they were before the plan was created.

"We wanted to make sure our members had options," Milus said.

After rolling the plan out successfully to a local group of doctors in the spring of 2014, the plan soon went national to all participating companies regardless of their size. Part of the appeal for physicians, said Milus, was being able to serve more people. By participating in LiveHealth Online, physicians now have time to see more patients with acute health issues

instead of those with chronic health issues. Participating doctors also now have the option of working from home, something very appealing to those who were already semi-retired, said Milus.

While Dr. Wiita runs a specialty clinic in Minneapolis, her primary means of employment is through the LiveHealth Online program. On a given day, Dr. Wiita – who is licensed to practice medicine in nearly 40 states – can see up to 40 patients located all over the country.

Typically, most patients who use the service are suffering with either sinus or flu-like symptoms or have a presentable rash that can be viewed on camera.

CONVENIENCE FACTOR

Wiita said she's been able to develop a strong bond with some of her patients, just like she would if she was seeing them in person. And it's extremely convenient for her patients, two of which are homebound.

After her initial consult with Dr. Wiita, Clark had to leave her home only to pick up a prescription. No standing around in a crowded, and potentially germ-filled, waiting room of a doctor's office.

Clark requested Dr. Wiita for her follow-up appointment, with an instant messaging feature popping up asking whether she desired to change doctors based on her wait time. Clark chose Dr. Wiita again thanks to a wait time of less than 10 minutes.

"I have used it multiple times because it is so easy," Clark said. "I don't want to wait to get an appointment with a doctor. I can just go and visit with them from the comfort of my home."

Coworker Lyle Beefelt had a similarly positive experience. Suffering from an upper respiratory infection at the end of a work week last summer, the Service Authority's Management and Budget Director knew he could either go to an Urgent Care office or dial up LiveHealth Online if he wanted to be



seen that weekend. He chose the latter, and by the next Monday, he was well enough to come back to the office after picking up a prescription that weekend.

"The pharmacy asked me who the doctor was from Missouri that prescribed me the medicine and I told them I did it online," said Beefelt. "They thought that was pretty cool."

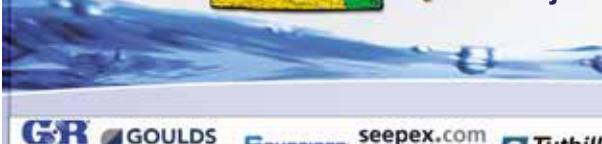
MORE INFORMATION

For more information on LiveHealth online speak to your health benefits representative or visit: <https://livehealthonline.com/>. You can still take advantage of this service even if your company/utility does not sponsor it. ☎



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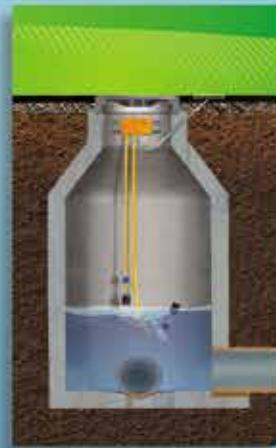
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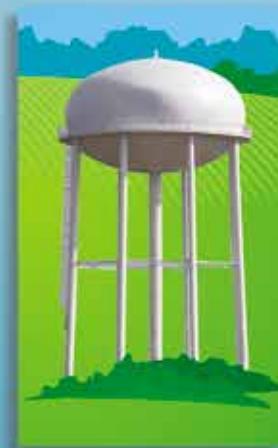
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LEED: Serious About Sound

By Kathi Mestayer, Suitability Committee

In last summer's *Conduit*, there was an article about office noise and the effect it can have on an employee's ability to focus, productivity and job satisfaction. This article is about how LEED, or USGBC's Leadership in Energy & Environmental Design program, has recognized noise-related issues and their important impacts on sustainability, and have responded by creating credits for acoustics in various work environments.

ACOUSTICS COUNT

In the LEED program, credits are awarded for building acoustics, specifically for classrooms and healthcare structures (in 2009), and generally for buildings of all purposes (in 2013). "The LEED 2009 ratings systems for schools and healthcare covered acoustics because of the overwhelming evidence that it critically affects learning and healing environments," according to Larissa Oaks, LEED Indoor Environmental Quality Specialist with the U.S. Green Building Council. For healthcare settings, LEED's formal intent was "To provide building occupants with an indoor healing environment free of intrusive or disruptive levels of sound."

Over time, a number of surveys by the Center for the Built Environment (CBE) and other groups showed that occupants of office buildings and other work environments rated acoustical quality as a leading source of dissatisfaction. Employees were dissatisfied with the level of "acoustic comfort" in their workplaces, even though



"Acoustic comfort is defined as conducive to speech intelligibility, speech privacy, low distractions and annoyance, and concentration where appropriate."

they were generally satisfied by other aspects of the buildings, such as thermal comfort, air quality, and energy consumption.

Acoustic comfort is defined as *conducive to speech intelligibility, speech privacy, low distractions and annoyance, and concentration where appropriate*.

Optimizing good acoustics and green design can be a balancing act. "The imperatives of green design, such as lower-energy consumption mechanical equipment and designs, harder-surfaced materials, and more glass resulted in spaces that achieved high marks for efficiency (and high LEED certification levels), while simultaneously not meeting the needs of the occupants acoustically," according to the lead technical advisor for the acoustics credits, Ethan Salter, Principal at Charles M. Salter Associates in San Francisco.

TO HEAR OR NOT TO HEAR?

That's a tough question. For a building to provide acoustic comfort, it must minimize stress and distraction. Employees have to be able to hear each other when talking over a project, decision or idea, and also to work quietly without distractions when focus is needed. There are often competing needs for collaboration, as well as for open environments with heads-down workspaces and speech privacy. Allowances for both should be provided, so when someone needs to have a private conversation, they can do so with little disruption to nearby occupants. So, LEED's credits include a variety of acoustical properties.

In order to meet the varying needs of people in LEED-certified spaces, the Acoustic Performance credits specify

measures to take (and ways to measure) sound isolation, speech privacy, background noise, and external noise. For example, some acoustics credits apply limits for noise from HVAC (heating and cooling) systems, and noise from adjacent spaces.

Standards are also set to minimize reverberation from hard surfaces, which makes speech harder to understand.

Reverberant environments can degrade speech intelligibility and increase the noisiness of a space, with greater potential for distraction. To mitigate reverberation, designers can incorporate absorptive materials where possible; there are a number of new, sustainable material options that fit within the green framework.

As of this writing, LEED credits are in place for acoustical performance for offices classrooms, conference rooms and other workspaces, including laboratories. There is also a Pilot Credit (#57) for exterior noise control in the USGBC library for ongoing discussion.

To take a closer look at an example of LEED acoustical credits, go to: <http://www.usgbc.org/node/2614139?return=/credits/new-construction/v4/indoor-environmental-quality.> ☐



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Amwell - Bar screens, clarifiers, gear drives, grit removal, paddle flocculators, rectangular collectors, rotary distributors, DuraMax stainless steel chains, scum skimmers



Aquaturbo- Surface aerators, mechanical mixers, decanters, floatables control

Aquionics- Open and closed channel UV disinfection



BDP Industries-Belt filter presses, screw presses, gravity belt thickeners, rotary drum thickeners



Continental Blower- Multistage centrifugal blowers



Clarifier Cleansweep- Clarifier algae control systems



Ebara Pumps-Water and wastewater pumps, submersibles, dry pit submersibles, self primers, grinders, end suction centrifugal, multistage, dewatering, sump, stainless, and axial flow pumps.



Enduro Composites-Odor Control systems including absorbers, scrubbers, and biological filters



Excelsior Blower-Engineered PD blower packages Gardner Denver and Sutorbilt Blowers



Fломotion Systems-Peristaltic pumps, flow, level, and chemical metering equipment.



Fluidyne Corp.-ISAM SBR, jet aeration, Hydro-Grit, tertiary filtration



Jesco America Corp.-Chemical feed systems and metering pumps.



Veolia Water- Headworks, grit, and CSO/ stormwater controls, bar screens, fine screens, spiral screens, drum screens, screenings compactors, Mectan grit removal, package septage and headworks equipment



Keystone Conveyor-Belt and screw conveyors



Kruger- AnoxKaldness IFAS and MBBR, ANITAmox Annamox deammonification, BIOSTYR Biological Aerated Filter, NEOSEP MBR, OASES high purity oxygen systems, ACTIFLO ballasted clarification, Hydrotech Discfilter and Drumfilter, Xtream Hollow Fiber Membrane System, Odo Watc/ Odo Sulf.



Lobepro - Rotary lobe pumps



Mixtec North America - Mixers, flocculators for water and wastewater treatment



Noxon - High solids centrifuges



Polydyne - Dry and emulsion polymers, polymer feed systems.



Prime Solutions-Rotary Press dewatering systems



Pulsair-Mega-Bubble non-aerating mix systems



PX Pumps-Submersible and dry pit submersible Pumps.



Stamford Scientific-Fine/coarse bubble diffusers, membrane diffusers, material options, ceramic retrofits, fixed or retrievable grids



Tenco hydro - Dissolved air flotation lamella clarifiers, grease/concentrators, oil/water separators.



Therma-Flite - Class A biosolids Dryer System



Thermal Process Systems - Class A thermophilic biosolids ATAD systems, mesophilic aerobic digestion, sidestream ammonia treatment



Ultraflore - Aluminum geodesic domes and heavy-duty flat covers.



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Debt Refinancing: An Alternate Source of Capital

BY ANTHONY HESS, VDH

Water and wastewater utilities have found themselves subjected to new or more restrictive budgetary constraints due to the current economic climate. As a result, many utilities are looking for new ways to lower their overall expenses. Fortunately, the same economic conditions that have caused utilities to tighten their belts have also provided a new opportunity for savings generated by the municipal-bond market. Namely, debt refinancing.

The municipal-bond market and debt refinancing

According to an article in the *Wall Street Journal*, investors realized their "longest string of monthly gains in more than two decades in 2014" from municipal bonds (Kuriloff, 2014). As municipal bonds provide tax advantages to investors in certain tax brackets, some investors are able to reap benefits equal to higher interest rate investments that do not contain the municipal-bond tax advantages (Bodie, Kane, & Marcus, 2010). A surge of investors into the municipal-bond market has come at the same time municipalities are pinching pennies and borrowing less, leaving fewer opportunities available for those investors (Kuriloff, 2014). Interest rates

paid on municipal bonds have been lower over the past few years than they were for many earlier years (*Rates Over Time - Interest Rate Trends*, 2015). The high market demand coupled with the low interest rates available to municipalities, has created an excellent opportunity for utilities to refinance older municipal debt, secured at higher interest rates, at today's lower rates.

One such example is Arlington County, Virginia. They refinanced \$100 million through the Virginia Resource Authority (VRA) in 2014 to save \$147,000 annually (or about 0.2% of the annual Utilities budget) (Arlington County Homepage, 2014) (Arlington County Department of Management and Finance, 2014). Although this is a significant savings, the impact may be much greater for smaller communities for which debt service represents a much larger proportion of their operating budget. The Russell County Public Service Authority refinanced \$3.64 million in 2014 through the Virginia Department of Health's Drinking Water State Revolving Fund (DWSRF), resulting in an annual savings of \$64,470. This amount is equivalent to 5.8% of the annual drinking water operations budget for the Russell County PSA.

Is debt refinancing right for your utility?

While some utilities have been able to take advantage of the current municipal bond market conditions to successfully refinance their capital improvement debt, thereby lowering their annual expenses and freeing up more revenue in their operating budgets, others have not. Reserve fund size and credit rating requirements differ by refinance source as do loan terms. Utilities that qualify for debt refinancing should consider their overall financial goals as well as their financial flexibility and the specific loan terms offered. Waterworks should also shop around for financial products that meet their individual needs and requirements. In some cases, eligible utilities may choose to pass up savings opportunities in favor of other goals.

For example, the Town of Dublin, Virginia, chose to decline an offer from VRA to refinance waterworks debt that would have saved them \$110 thousand dollars in interest over the 23-year life of the bond, and \$733,000 by reducing the length of the debt. The town decided that VRA's reserve requirements would have left their rainy day fund too small to adequately respond to unexpected

emergency expenses. In addition, the new debt would have also had higher payments in future years due to the back-loading structure of the debt. This would have forced the town to restructure or pay off its other debt holdings in order to free up more money to make the higher future payments. Ultimately, the town decided that debt-refinancing was not a good fit for them.

Debt refinancing sources: waterworks

Some options waterworks may pursue for refinancing debt include: the Virginia Drinking Water State Revolving Fund (DWSRF), the Virginia Resource Authority (VRA), USDA's Rural Development Program or commercial banks.

One of the lowest rates in Virginia for refinancing waterworks debt is offered by

the Drinking Water State Revolving Fund (DWSRF) administered by the Virginia Department of Health Office of Drinking Water, Financial Construction Assistance Program (FCAP). The DWSRF has been providing low interest loans and grants for drinking water infrastructure projects in Virginia since 1997. In 2014 the program began promoting the fact that it offers debt refinancing for local debt obligations related to drinking water infrastructure. In order to be eligible, projects for which debt was incurred must have had a construction initiation date after July 1, 1993. The interest rate is set at the DWSRF core term rate, which is 1% below the Municipal 20 Year AA Revenue Bond Rate. This is typically between 1.5% and 2.5% for a term of 20 years. Local government owners of a publicly owned community waterworks

are eligible. Private, state, and federally owned waterworks are not eligible for this refinancing opportunity.

For more information about the Virginia DWSRF please contact Howard Eckstein in the VDH Office of Drinking Water at howard.eckstein@vdh.virginia.gov or 804-864-7507.

For more information about the Virginia Resource Authority refinance of waterworks-related debt, please contact Shawn Crumlish, Virginia Resources Authority, Director of Debt Management at scrumlish@virginiaresources.org or 804-616-3445.

Debt refinancing sources: wastewater

The Clean Water State Revolving Fund administered by DEQ does not refinance wastewater-related debt. However, utilities may pursue refinancing wastewater related debt with the Virginia Resource Authority, as did Arlington County.

For more information about the Virginia Resource Authority refinance of wastewater-related debt, please contact Shawn Crumlish, Virginia Resources Authority, Director of Debt Management at scrumlish@virginiaresources.org or 804-616-3445.

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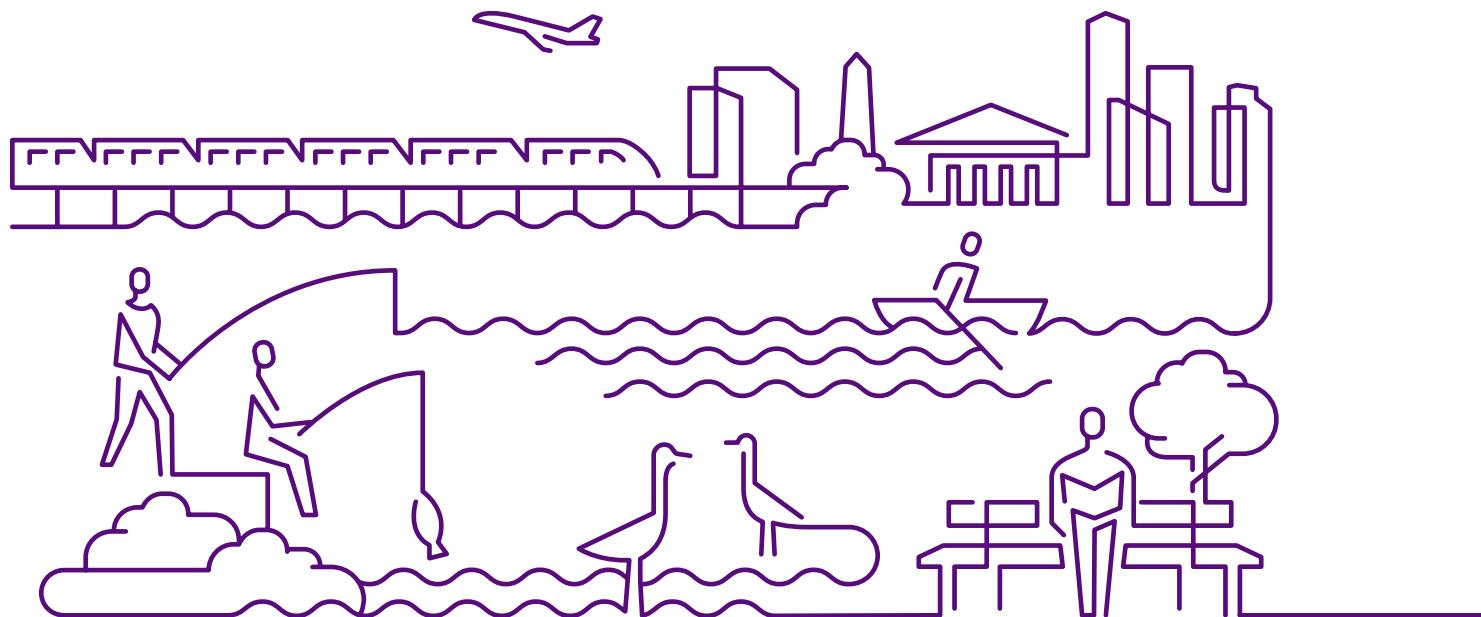
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Renewable Nutrients Debuts Quick Wash™ Mobile Pilot Unit for Phosphorus Extraction and Recovery

Renewable Nutrients, LLC, a firm focused on nutrient recovery and reuse, today announced the successful installation and operation of its Quick Wash™ phosphorus extraction and recovery mobile pilot plant. The mobile Quick Wash unit, which can be easily moved and transported between waste treatment facilities throughout the country, was set up for testing at the Ephrata, Pennsylvania treatment facility Plant 1 in January. The purpose of the pilot is to prove the efficacy and efficiency of the Quick Wash process in extracting and recovering phosphorus from solid waste streams at both municipal wastewater treatment facilities and farming operations with high densities of livestock.

"I'm extremely pleased with this debut of the Quick Wash technology. It represents the first industrial-scale deployment of a practical solution for extracting and recovering nearly 100% of the phosphorus present in biosolids," said Jeff Dawson, Renewable Nutrients' Chief Executive Officer.

"Our development partners, Synergistic Environmental Solutions, Keystone Engineering and Kershner Environmental Technologies, did a fantastic job of constructing a very presentable mobile unit as well as a high-tech operational platform, complete with state-of-the art automation software for running and monitoring the Quick Wash system," added Dawson.

The Quick Wash pilot unit remained at the Ephrata, PA facility through the end of February, where the Renewable Nutrients team tested and monitored the phosphorus recovery levels achieved as well as the overall efficiencies of the system's operation. The mobile pilot is currently on a three-month tour, where it will be operational at various waste treatment plants in Pennsylvania, North Carolina, and Maryland.

"Extracting and recovering phosphorus from biosolids and animal manure solids has risen to a level of paramount importance among both wastewater treatment plant operators

as well as farmers in the Chesapeake Bay watershed," said Jay R. Snyder, Environmental Resource Manager with Ephrata Borough. "Phosphorus is a valuable resource needed to support both animal and crop production, and it is used as a raw material in many manufactured goods. But as with any resource in the wrong place it can become a pollutant. So a simple, economical solution for extracting this valuable resource at the source is something in which my industry colleagues and I are very interested," added Snyder. He continued, "I'm happy to play a part in facilitating the first operational demonstration of this innovative Quick Wash technology here at the Ephrata treatment plant."

The mobile Quick Wash pilot is designed to process municipal waste sewage sludge for the purpose of phosphorus extraction and recovery. The system combines chemical treatment and membrane separation to produce a granular form



"Extracting and recovering phosphorus from biosolids and animal manure solids has risen to a level of paramount importance among both wastewater treatment plant operators as well as farmers in the Chesapeake Bay watershed."

of calcium phosphate and low or even no-phosphorus biosolids. The calcium phosphate can be sold on the open market and the resultant solid material can be safely land applied or landfilled without fear of phosphorus soil saturation or runoff. Phosphorus is a scarce natural resource vital as a fertilizer and a key element in the food chain; therefore, the prevention of wasteful landfilling by recovering this limited natural resource is critically important. The Quick Wash technology could be a significant benefit to municipal wastewater treatment plants that need to remove phosphorus from their solids or final effluent. In addition to the

benefits of phosphorus recovery, this process could replace costly side stream treatment of phosphorus rich recycle flows from sludge dewatering processes.

The mobile pilot has been outfitted with a complete PLC and PC-based instrumentation and Supervisory Control and Data Acquisition (SCADA) system in order to continuously monitor and control the Quick Wash process. The data from the SCADA system is combined with both on-site and independent laboratory analysis to evaluate the performance of each pilot plant run. The in-field pilot testing, such as what Renewable Nutrients is conducting at the

Ephrata waste treatment facility, is a critical first phase in the development and implementation of a full-scale system for municipal treatment facilities, while providing a platform to fully demonstrate both the process and economic benefits of this exciting new phosphorus recovery solution.

"I am very excited by Renewable Nutrients' Quick Wash pilot here in Ephrata," said Bill Toffey, Executive Director of the Mid-Atlantic Biosolids Association. "The wastewater treatment sector realizes that biosolids has levels of phosphorus higher than needed for good crop growth. The innovative technology that Renewable Nutrients is piloting may enable our treatment plants to produce a fertilizer for our farmer customers that is tailored to their crops and soils. I am very eager to see the results of its performance here in Ephrata and other test sites."

"We're really excited to have partnered with Renewable Nutrients, especially given our lead role in designing this impressive Quick Wash mobile pilot unit," commented Phil Schwartz, President, Keystone Engineering Group. "Together I'm confident we have created a practical system and solution for solving a phosphorus dilemma that waste treatment plants throughout the country and even the world have faced for many years. I'm elated to see Quick Wash come to fruition, and I'm pleased that the pilot plant is operating as successfully as we had anticipated in our original design plans," added Schwartz.

To view and/or download photos of Renewable Nutrients' Quick Wash mobile pilot plant, please visit: <http://www.renewablenutrients.com/pilot/>.

About Renewable Nutrients, LLC

Renewable Nutrients is a private, North Carolina-based company that turns waste into sustainable and profitable resources. Through its exclusive license of the patented Quick Wash™ process, Renewable Nutrients allows waste treatment plants and farms to extract and recover phosphorus from human biosolids and manure solids. The remaining biosolids or manure solids, which contain crop-friendly ratios of nitrogen-to-phosphorus, can be land-applied, thus lessening the amount of waste trucked to disposal sites and reducing or even eliminating the incidence of nutrient pollution from soil runoff. In addition, municipalities and farms can sell the recovered phosphorus on the open market, and engage in the trading or marketing of nutrient credits. Please visit Renewable Nutrients at www.renewablenutrients.com. ☎

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Industrial Waste and Pretreatment Committee

WORKSHOP AND SEMINAR

By Robbie Graham, IWP Chair



"Together: Developing and Meeting the Limits" was the theme for the 31st Annual Industrial Waste and Pretreatment Seminar held at the Charlottesville Omni March 2-3, 2015. This year's attendance was 137 with 20 vendors, making it yet another successful conference. The half-day workshop presented several case studies on pollutant control concerns and the development of local limits in unique industrial discharger situations. Topics included addressing conveyance system corrosion issues, using WET to assess impacts of TDS, pretreatment of food processing wastewater, and cleaning up industrial clean-up operations. The full-day seminar provided updates on regulatory initiatives with speakers from EPA and the legal community. In addition, speakers from municipalities, industry, and consulting firms shared stories related to wastewater treatment on such topics such as PCB TMDL development and cost analysis for handling landfill leachate.

The conference provided the opportunity to recognize a number of industries with the VWEA 2015 Industrial Waste and Pretreatment Environmental Excellence Awards. These awards are presented to industrial users who are regulated under an approved pretreatment program or VPDES program, have achieved 100% compliance with their permit requirements and have demonstrated dedication and commitment to pollution prevention, waste reduction or conservation through implementation of an Environmental Management System.

There are three categories of awards: Silver – 100% compliance with pretreatment regulations for a full year; Gold – 100% compliance

with pretreatment regulations for two to four consecutive years; and Platinum – 100% compliance with pretreatment regulations for five or more consecutive years. The recipients this year are:

Silver

- City of Norfolk, Department of Utilities, 37th Street
- City of Norfolk, Department of Utilities, Moore's Bridge Plant
- International Paper

Gold

- Packard Campus, Library of Congress, National Audio Visual Conservation Center
- Cintas Corporation
- Dominion Virginia Power
- Norfolk Southern Railway Company
- TE Connectivity
- Fareva Richmond, Inc.

Platinum

- Covanta
- Coca-Cola Refreshments
- Greater Richmond Transit Maintenance Shop
- Koppers Inc.

In addition, the committee approved a new award this year: the Environmental Warrior Award. This award is presented to a discharger that has significantly improved their compliance program during the past year. The recipient of this inaugural award is:

- Yokohama Tire Manufacturing

Congratulations to these industrial users for their successful efforts toward program compliance and improvements.

As outgoing committee chair, I would like to take this opportunity to thank the committee membership, and the vendor participants, for their encouragement, guidance, and hard work in making this yet another very successful event. I look forward to working with you in the coming year.

Finally, if you are interested in participating in our committee activities, please contact rising chair Steve Matoska at smatoska@ch2m.com, or Kathy Rabalais, VWEA Manager at www.vwea.org.

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LIMS

versus QMS

What Are They and Do I Need Both?

A LIMS VS. QMS WHITE PAPER FOR LABORATORIES

By Juliann Poff, Qualtrax, Inc., Christiansburg, VA

If I run a laboratory, do I need one of these or do I need both?

So let us start with a description of the two systems.

A LIMS is a Laboratory Information Management System or sometimes also referred to as a LIS – Laboratory Information System or a LMS – Laboratory Management System.

A QMS refers to a Quality Management System or sometimes also referred to as an eQMS – Electronic Quality Management System or a Compliance Management System.

In a laboratory setting, there is a plethora of data that needs to be tracked. Very important work is being completed on a day-to-day basis and a system needs to be able to help a laboratory efficiently capture that sample analytical testing data. It needs to be able to provide traceability for the results, track the items that are used during the testing process back to lot numbers and be able to validate and QA that data to ensure its accuracy. As we know, testing laboratories of all types (environmental, forensic, clinical, food, reference, veterinary, and agriculture) have to routinely prove that their results are accurate.

Also in a laboratory setting there are quality and/or compliance regulations that need to be adhered to, such as ISO 17025, ISO 17020, ISO 15189, FDA, CLIA, NELAC, GLP, & EPA. These regulations are put into place to ensure that a laboratory has the proper procedures in place to tell the laboratory technicians how to perform those tests, maintain documentation on all of the instrumentation in the laboratory, MSD sheets to ensure the safety of the employees, and most importantly, be able to track back to the personnel who performed those tests to ensure that they were qualified to do so.

Day-to-day test data is typically captured into a LIMS, which is very case centric. The information on the high-level quality and management of the laboratory is typically captured into a QMS. LIMS enable you to not only track casework information, but also to report out data and statistics on that casework. This can be extremely helpful when grant funding is used to support a lab because you have to report those numbers back (how many cases worked under a certain grant dollar amount during the first quarter, how many specimens, etc.) This is also used for labs funded by the government since they have to report to legislators how many cases were worked in the previous year as compared to the current year, and how many in each discipline.

Laboratories must remain competitive for jobs and must adhere to a quality or regulatory compliance on a local, state and/or federal level to receive funding. This is where a quality management system comes into play to help manage and protect all of the information pertaining to their compliance requirements. More than just a document management system, a quality management system often allows you the ability to not only manage your documents, track the revision history of a document to know who signed off on it, and when and what changes were made and why, ensure that everyone is using the most current version.

Laboratories are not only required to prove that their day-to-day case information is captured accurately, but that their procedures are being followed, that there is a way to prove they are being followed, and that their employees are competent to perform those tests."

A QMS should also have the capabilities for you to manage and automate both quality and business processes in your laboratory. You would also store your organization chart, your employees' job descriptions, training checklists and proficiency testing results to be able to prove the competency of your employees and their technical aptitude to perform valid tests. In many cases, there are quality records that are not directly related to the casework and laboratories need to have a secure, accessible way to manage this information.

Laboratories are not only required to prove that their day-to-day case information is captured accurately, but that their procedures are being followed, that there is a way to prove they are being followed, and that their employees are competent to perform those tests. Any question of impropriety can be costly, not only in money, but in the form of lawsuits for questionable samples as well as the loss of time and earned revenue to earn back that respect and credibility to the laboratory. Sometimes these labs cannot recover at all, causing loss of services to that community along with the loss of jobs.

If this information is not being controlled by a laboratory information management system and a quality management system, it can leave your laboratory vulnerable. Employees could delete test results and/or procedures inadvertently, use wrong versions of procedures and put your laboratory and its results in jeopardy. In many laboratories, deadly consequences are the result of inaccurate results.

In most laboratories, the same individuals who are asked to administer their quality management system often have the task of also performing the tests themselves. They need their systems to help the organization become more efficient and help build a culture of quality in their organization while helping them allocate their time more effectively.

Laboratories are typically audited annually by third-party auditors that represent various quality or government organizations. Audits can be very time

consuming and stressful. Having both of these systems in place during an audit is beneficial. During an audit you are going to be asked to provide a master controlled document list along with all of the current standards and their associated standard operating procedures. These are housed and controlled in your quality management system. You will also be asked to show examples of analytical work as well as reports or certificates of results and these are housed and controlled in your laboratory information management system. The efficiencies gained by having both types of systems will allow you to be better prepared at all times and reduce your time to audit. The actual audit will run more smoothly and allow you to focus on continual improvement for your laboratory instead of the auditors having to review and write up findings on the inefficiencies and/or inaccuracies in your work.

Now that you understand the benefits of having a LIMS and a QMS, you have to make your business case to go to senior management to get approval to procure these tools for your laboratory. They are going to ask you, "How many types of software does one lab need?" They will argue that, "you only need one type for each capability." That is somewhat true. Some software may be able to do some portion of the other. For example, some LIMS may have a document management portion to their software while a corresponding QMS has workflow capabilities to track samples. However, individual expertise in their LIMS and QMS space leaves the cross over portions typically lacking and often times better left to the portions of the processes that their expertise is known for. Laboratory information management systems do casework really well and quality management systems do quality really well. We have seen laboratories in the news over the years lose their accreditation due to not following procedures or not having the proper checks and balances in place. This has cost them a lot of money, loss of jobs, and years of time to earn their

credibility back. So it is worth paying the money to get these systems and processes up and running on the front end to eliminate the heartache and pain in the end.

Both of these systems are an integral part of the overall quality of your laboratory, so do not try to cut corners. "They both do different things, so buy both," says Jenna Oakes-Smith from the St. Louis Metropolitan Police Department Crime Laboratory LIMS Administrator and Clint Thomason, Quality Manager with the Colorado Bureau of Investigation.

A special note of thanks needs to be given to all of those who helped contribute to this paper:

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Police Department Laboratory Division
Susie Honza, Forensic Consultant/Trainer,
Qualtrax, Inc.

About the author

Juliann Poff has been with Qualtrax for 10 years. In addition to her duties as Inside Sales/Channel Development Manager, she also serves as a member of the Internal Audit Team for their parent company CCS-Inc., sister subsidiary FoxGuard Solutions, Inc. and Qualtrax, Inc. auditing to their ISO 9001:2008 accreditation. Juliann has served as the Quality Improvement Team Administrator when rolling out the Crosby quality methodology to the organization and she has participated in and led several quality improvement teams. Previous to Qualtrax, Juliann served as the Site Coordinator and Document Control Administrator for a Fortune 500 Manufacturing company helping to manage their ISO 9001 and ISO 14001 accreditation. Juliann is an active member of her community serving in leadership roles in several community service organizations and recently graduated with her MBA. Juliann enjoys learning about the compliance industry and matching up prospects with Qualtrax to help continually improve those organizations. ☺

Lab Practices Committee

ACTIVITY NEWS

By Kimberlee Stubbs, LPC Chair

The VWEA/VA AWWA Joint Laboratory Practices Committee (LPC) is proud to announce that the 21st Annual Good Laboratory Practices Conference will be held at the Omni in Charlottesville on July 27-28 this year. The event will consist of six half-day workshops on July 27 with topics on microbiology, basic laboratory instrumentation, laboratory calculations, LIMS, VPDES permits and DMR reporting, proficiency testing, and materials/regent traceability. Technical programs will be presented on July 28 with topics from the areas of drinking water, wastewater, and electronic management. There will be an exhibitors' reception on the evening of July 27 with the latest in instrumentation and equipment on display.

The LPC also plans to present a workshop at this year's WaterJAM in Virginia Beach on September 14. The theme is *The Future Is Now*.

This is an excellent opportunity to meet and network with fellow professionals from all over Virginia, and earn CPEs for wastewater and water operators and CECs.

Information regarding these worthwhile events, as well as contact information, will be posted on the VWEA and VA AWWA websites. So mark your calendars, and be on the lookout for more information to come!

The LPC membership is represented by a variety of municipal wastewater and drinking water laboratories, commercial laboratories, as well as regulatory agencies and laboratory vendors. Meetings are held throughout the year to discuss such interesting topics as laboratory issues, changing methodologies, regulatory concerns, and quality assurance requirements.

The LPC meetings for 2015 are scheduled as follows: April 8, June 24 and October 14. Meetings are held at the Henrico Water Reclamation Facility with subcommittee meetings starting at 10am and full committee meeting at 11:00 a.m. There is a short technical presentation with lunch provided. We encourage everyone interested to join and participate, and take advantage of the wealth of knowledge and experience that is there. ☺



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Come join us in September for WaterJAM – the Joint Annual Meeting of the Virginia Section American Water Works Association and the Virginia Water Environment Association! Since 2002, WaterJAM has been a record-setting conference registering growing numbers of participants each year. More than 1,300 professionals join their friends and colleagues to make WaterJAM one of the most successful state conferences in the United States.

This year's theme, *Catch the Wave*, is appropriate because we are back in Virginia Beach – home of the world's longest pleasure beach. More importantly, *Catch the Wave* is in recognition of the exciting time our industry is going through. This year's WaterJAM promises the latest in technology, to help you advance your knowledge in this highly technical world, while you have a little fun along the way.

Your WaterJAM Planning Committee has been working tirelessly over the past few months, and will continue doing so, to fulfill our mission:

Plan and implement a comprehensive conference that brings together technical excellence and innovation while supporting networking opportunities at an exceptional value to all attendees.

A tremendous team is working on your behalf to plan this year's WaterJAM, and our goal is to exceed your already high expectations for this annual event. Many new committee members have brought new life and excitement into this process which will be reflected when you join us in Virginia Beach later this year!

We have partnered with the Virginia Beach Convention Center (VBCC) and Hilton Virginia Beach Oceanfront Hotel to host our activities from September 14-17, 2015. The oceanfront location not only offers picturesque scenery, but access to local shops and restaurants. We anticipate almost 1,400 professionals coming together to present new ideas, update you on current regulatory initiatives, and discuss industry hot topics that we face in our water and wastewater world.

As a testament to WaterJAM's successful history, we had another huge response to our Call for Papers for 2015. With more than 350 abstracts submitted, our Technical Program Co-Chairs, Steven Cook and Aditya

Ramamurthy, Vice Co-Chairs, Evan Bowles and Mike Mull, worked exceptionally hard to put together another comprehensive technical program with something for every attendee. Due to this overwhelming response and the quality of the abstracts, this year's Technical Program will once again offer ten concurrent sessions, for a total of 200 presentations to be given over three days. Some of the sessions offered this year will include: Sustainability, Collection and Distribution Systems, Energy Management and Reduction, Alternative Project Delivery, Water and Wastewater Treatment, Biosolids Management and Solids Handling, and two sessions on Stormwater Management, and Asset Management. With abstracts from 26 states, Washington DC, and the US Virgin Islands, we're certain there'll be something for everyone offered in this diverse program from both local and national experts! All of the sessions provide the opportunity for professional engineer educational credits; the large number of presentations will also allow numerous opportunities for both water and wastewater operator educational credits.

Meanwhile, Local Arrangements Co-Chairs, Scott Funk and Ryan Clark, Vice Co-Chairs, Mark Swilley and Joe Swain, and their well-oiled machine of volunteers from both VA AWWA and VWEA have been

hard at work ensuring that your conference experience provides much more than just technical growth. The committee is focused on providing activities that give participants opportunities to network, socialize, learn, and have fun – all hallmarks of WaterJAM. While it's a little early to provide details, there is no doubt this year's conference will be as memorable as ever.

As always, we strive for excellence in both technical and social WaterJAM activities, and this year will be no different. As such, we've selected the Signature at Westneck in Virginia Beach to host our Golf Outing this year. In addition, the ever-popular Clay Shoot will continue to be held at Old Forge Sporting Clays in Providence Forge. These events are sure to provide loads of competition, hole sponsorship opportunities, and chances to win excellent prizes provided by generous local businesses as well our own water and wastewater community.

For those who would rather stimulate the intellect, we've planned some Monday workshops that will provide attendees the opportunity for additional education and collaboration. These workshops will cover timely topics, including Biosolids, Collection System Modeling, Sewer System Rehabilitation, System Vulnerability, and Lab Practices.

After your day of golfing, clay shooting, or enjoying the workshops, join your friends at our host hotel, the Embassy Suites, for the Meet and Greet as we kick off the conference in style with great food and music. Don't miss this event, or you'll likely have your friends telling you the next morning how much fun you missed!

Tuesday's activities start with the annual 5K fun run/walk along the oceanfront to benefit Water for People. This is always a well-attended event and a great way to kick-off your conference day. The 5K is followed by the General Opening Session starting with a keynote speaker from ODU for a time discussion of climate change and sea level rise.

Technical sessions will follow on Tuesday afternoon, all day Wednesday, and Thursday morning. Tuesday afternoon will be the Water Reach Silent Auction and Reception in the exhibit hall until 6:30. After 6:30, Tuesday night will remain a free night for consultant and vendor outings or simply to enjoy at one of the local eating or nightlife establishments.

As always, the pinnacle of the conference is Wednesday night's Award Banquet and Fun Night, which will be held at the VBCC. The pre-dinner reception is a great time to mingle with friends and colleagues, and a perfect opportunity

to meet our WEF and AWWA national representatives. After dinner, it's always exciting to recognize the top performers in our profession with prestigious awards.

Once the banquet is finished, it will be time to let loose and have some fun! Once again this year the fun night will feature themed games and prizes along with dancing and refreshments. More to come on these fun games and activities!

The Young Professional (YP) Committee is as active as ever for this year's WaterJAM. The YP Planning Committee is striving to make WaterJAM 2015 one of the best ever for new and current young professionals and students. They're currently planning the following events:

- Community Service Project – Planned for the Sunday, September 13, prior to the start of WaterJAM. All are welcome to lend a hand.
- Corn Hole Challenge – This event has been a huge success the last few years. This year there will be three sets of boards set up in the Exhibit Hall to play on. The best part? You have a chance to win one of the sets of corn hole boards.
- YP Technical Session – An entire technical session showcasing current Young Professionals.
- YP Workshop – This year's theme is *Engineering the Future* with industry experts providing unique insights into how the current hot topics are shaping the future of all that we do.
- Poster Contest – Another great time to showcase students and YPs. The boards will be set up just outside of the exhibit hall. Watch for e-mails calling for abstracts; authors of winning posters will receive \$1,000 and more.
- YP Reception – Join other young professionals and students who represent the future of our industry in a relaxed atmosphere. This is a great opportunity to learn about YP activities and to get to know other YPs in varying fields.
- Further details for all YP events will be available in the summer issue of *The Conduit* and Tap Into Virginia.

In the meantime, if you have questions or ideas, please contact our YP Liaison Jason Kerns at Jason.Kerns@hdrinc.com.

The Exhibits Committee Co-Chairs, Matt Harrison and Matthias Wittenberg and Vice Co-Chairs, Jon Casarotti and Dan Ruby, are working to make sure this year's Exhibit Hall is even better than last year. At each break in the Technical Program Tuesday and Wednesday be sure to visit the Exhibit Hall to see the latest technology while grabbing some refreshments. We will

continue to feature exhibitor trailers, so look for the latest valves, pumps and other technologies emerging in our industry. As always, the exhibit area will be hosting the Rapid Tappin', Meter Madness, and other Utility Rodeo exhibitions. And don't forget the Scavenger Hunt, Water Reach Silent Auction, the WaterJAM Exhibitors' sponsored Water For People Raffle, and free Wi-Fi access as you visit with vendors and networking over delicious food and beverages.

In case you have extra time, we've planned additional events before and after the conference. The Water Taste Test is returning. Come out on Sunday to the boardwalk and support the team in educating the public about the value of water and the benefits our industry provides to our communities.

Before you leave for home after your week in Virginia Beach, we suggest you consider one of our facility tours. This year, Pete Baskette is arranging tours that are sure to be informational as well as entertaining.

Keeping up with technology, and to improve sustainability, we encourage the use of the WaterJAM app at this year's conference (iOS and Android). By using the app, you can bypass the printed program and reduce the amount of paper at the conference. This year, WaterJAM is working with the VA AWWA/VWEA Sustainability Committee to put on a conference with as small an environmental footprint as ever. Stay tuned for more information in the coming months how, with your help, WaterJAM 2015 can be the most sustainable event to date! Also, be sure to follow us on Twitter (#WaterJAM) and find us on Facebook at www.facebook.com/VirginiaWaterJAM.

The WaterJAM 2015 conference is the premier event for Virginia water and wastewater professionals, and hotel rooms will move quickly, so make sure to register and book early (and save money in the process!). Registration opens online in early May, so be sure to check the VA AWWA and VWEA websites for registration information. We are tremendously excited about this year's WaterJAM and on behalf of your hard-working WaterJAM Planning Committee, we look forward to seeing you in Virginia Beach in September!

Respectfully yours,
Stephanie Spalding
(Twitter: @StephanieCookVA) and

Mike Demko
(Twitter: @VACivilPE)
WaterJAM 2015 Co-Chairs ☎

FREE CONTINUING EDUCATION CREDIT COURSE:

The WHO, WHAT, WHEN, WHERE, and HOW of

Jar Testing

By Terry Looney, Water-Otter.com

Free CPE Benefit Explanation

If you received the last two issues of *The Conduit*, you probably noticed that our previous *Troubleshooting and Problem Solving* courses offered readers a chance to obtain 0.25 CPE credits per course. The *Who, What, When, Where, and How of Jar Testing* course, introduced herein, offers readers a chance to earn 0.5 CPE credits. This course, combined with the previous two trouble shooting courses, allows our readers to earn one full CPE credit, compliments of VWEA and Water-Otter.com. To earn the .5 CPE credits, the readers must log onto Water-Otter.com to complete the course. Please note: There is still time to go back and take the previous trouble shooting courses for an additional 0.5 CPE credits.

Course Description

The *Who, What, When, Where, and How of Jar Testing* course presents a summarized history of jar testing development and a guide to the application of jar testing in the water and wastewater industry.

Jar testers are used daily and are of significant value to the quality assurance

in both water and wastewater labs, but do you know how and why it all began, what it can do, and how to use the technology? This course will enable you to understand why jar testing came to be and how to best employ the technology in your profession, providing a basis for more comprehensive jar testing education.

History of Jar Testing

In the mid-1930s chemicals were rapidly being introduced as a means to remove impurities from water samples. These chemicals were initially added to water samples which were contained in jars. The mixture was then stirred with a spoon to see what affect the chemical had on the water sample; hence the phrase, "jar testing." In order to consistently evaluate the effects of the treatment chemicals it became necessary to be able to accurately simulate and reproduce the effects of chemical addition in a lab environment through the use of good scientific procedures.

A very innovative and inventive character, Mr. Hampton "Doc" Rexrode, developed the first commercial paddle stirrers for this purpose while working for the laboratory

company Phipps and Bird, in Richmond, VA. I had the pleasure of working with Doc for several years and observed his pride at having developed this and other inventions resulting from his creativity. Today Doc might be seen as a bit eccentric, as he was motivated to create solutions without any significant regard to personal gain or notoriety. His was a labor of pure scientific curiosity and a drive to "build a better mousetrap." He had a knack for seeing simple solutions for complex problems. When Doc passed away in the mid-1990s, his legacy was that of a simple man with extraordinary vision.

The first jar testers (see an early example in fig. A) were not significantly different from those being produced today. Since then, technology has provided better hardware resulting in better test reproducibility and reliability. However, the jar testing concept and design has remained relatively constant. Early jar testers were mostly six vessel types. Since, there have been jar test devices of one, two, four, six, and eight vessels (and maybe some others this author has not seen). Interestingly, most of the jar testers produced today are similar to the original six-vessel type. This demonstrates the value of visionary design.

Today, jar testers are a common sight in most water and wastewater labs. As with many routine devices, their simplicity can easily lead to a lack of appreciation of their value and allow for careless, or uninformed, misuse. The remainder of this course will focus on the basics of modern jar testing procedures and operation.

Please log onto Water-Otter.com to complete this course and to earn .5 CPE credits. ☺



Mr. Hampton "Doc" Rexrode



Figure A



Central VA YP Activities Update

EVENTS

The Central Virginia section of the joint VA AWWA/WEA Young Professional Committee held its 2015 Event Planning/Recruiting Event on January 8, 2015 at Caliente Restaurant in Richmond. The event provided a great opportunity for networking, and five fellow committee members volunteered to assist planning efforts of the upcoming events in year 2015.

On March 12, the Annual Young Professionals Bowling Social Night was successfully held at Uptown Alley in Midlothian. The event attracted YPs of various background: R&D, engineering consulting, and local utilities.

Stay tuned for several upcoming events this year!

- April: Education/Afterhours Event
- May: Stream Cleanup¹
- June: Golf Lesson
- July: Flying Squirrels Baseball Game ¹
- October: Facility Tour
- November: Richmond WWTP Facility Tour, followed by Afterhours Event ¹

¹ Joint Event with CVRAC

We highly encourage involvement and participation! If you have questions or would like to participate please contact Jun Meng (jmeng@greeley-hansen.com). ☎



Committee Event Planning Meeting at Caliente Restaurant.
L-R: Emily Burns, Richard Kincheloe, Jun Meng, Lauren Zuravsky, Adrienne LaRue, Andrew LaRue, Felicia Bracey, Bruce Strickland.



Annual Bowling Social Night at Uptown Alley.
Front Row L-R: Olivia Jenkins, Jessica Hively, Dana Fredericks, Evan Bowles
Middle Row: Christine Olmeda, Rachel Wilson, Bruce Strickland, Chris Petree, Jun Meng, Lauren Zuravsky
Back Row: Ryan Wilson, Chris Wilson.

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EVRAC UPDATE

By Mark Swilley, EVRAC Chair

The Eastern Virginia Regional Activities Committee (EVRAC) continues to host quarterly luncheons and bi-monthly after-hours events. The most recent luncheon addressed HRSD Sustainability Initiatives presented by Mr. John Dano. A March luncheon was also presented by HRSD and Mr. Jay Bernas, addressing the subject of closure of the Chesapeake Elizabeth Treatment Plant and covered the topic of consolidation. Future luncheon topics may include DCR requirements for groundwater withdrawal permits; private property side sewer lateral rehabilitation; stormwater MS4's for small localities, and other interesting topics sure to stimulate your thoughts and questions. Stay on the lookout at the parent organizations web sites for future luncheons, and as always, your input is vital, so please let us

know if there is a subject and/or speaker you think would benefit a luncheon group or if you have any thoughts to share in general.

After-hours events continue to be a hit, this in spite of some uncooperative weather in February and March, so be on the lookout for an April/May event on the peninsula. As always, we try to alternate between the peninsula and the south side for convenience to the membership. Thanks to Hazen and Sawyer, Brown and Caldwell, HDR, and the other firms who have sponsored these after-hours evenings. If your firm is interested in being a sponsor, please get in touch with one of your EVRAC committee members.

Please be sure to update your contact information with the national organization periodically. ☎



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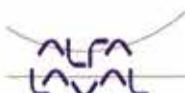
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