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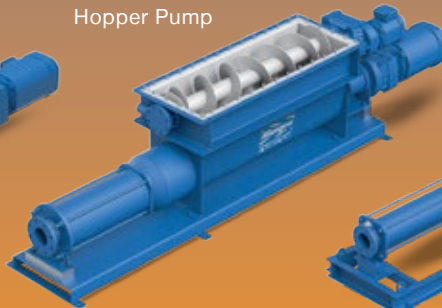
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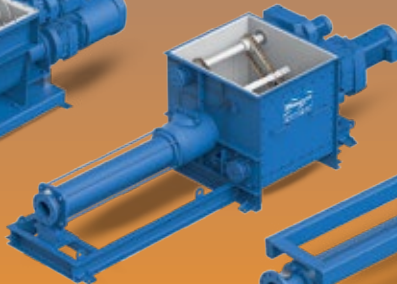
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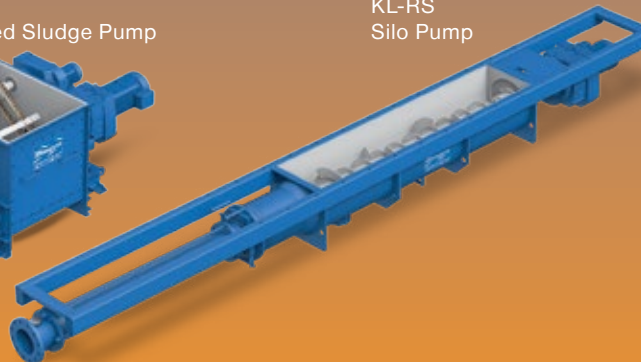
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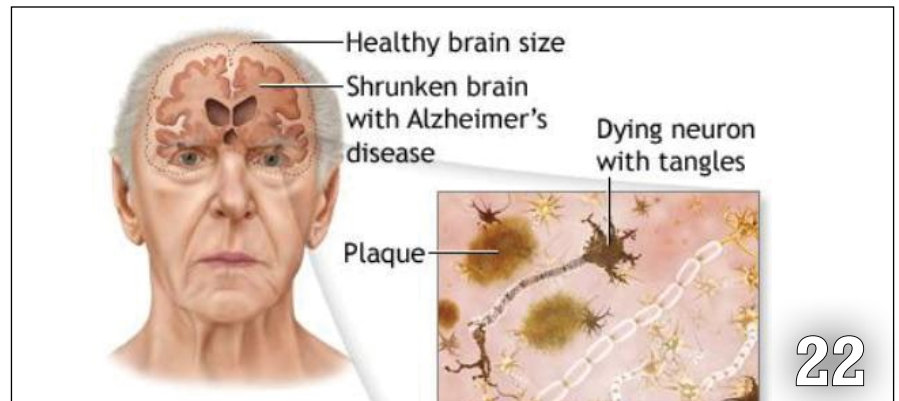
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Giles Demke

Heroes of Human Health

First and foremost, I would like to welcome our new editor of the *Digested News*, Bryan Mansell. He is stepping into the position and replacing Chad Burrell, who is now the WEAU Board Secretary. We thank Chad for the excellent job he has done in pulling content together and keeping everything on track and on time and wish him well in his new venture.

I was watching a home improvement program awhile back when a forth-generation plumber said something that stuck with me. He said his father had a plaque hanging in his office that stated, *Our Job is to Protect Human Health*. These words reminded me of the importance of the jobs we do day in and day out – from cleaning a sewer line at 3:00 am on Christmas morning to responding to an alarm during the family picnic. We are the front-line responders that keep the water moving, hidden heroes, unbeknownst to those we serve.

We are a tight knit community; highly trained and willing to meet the challenges placed before us. Training is an essential part of how we complete our tasks each day. We have seasoned professionals with



years of experience that are highly capable of teaching and training those who are entering the field. As I did in my last article, I challenge those of you who are our seasoned professionals to become a mentor to someone new, share your life skills and knowledge. And yes, this is a theme that will be appearing time and again.

A record number of people are taking the certification exams. There were 123 examinees at the exam held in August. Now is the time to share and train the next group of workers. To that end, the WEAU Board of Directors has generously authorized \$5,000 of the annual budget for operator training. Look for more

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WATER AND WASTEWATER

President's Message

information at the Mid-Year Conference in November. On a side note: if all goes as planned, the conference committee will be rolling out a new digital program for the Mid-Year Conference. The program will be available on an app on your smartphone. Please visit the WEAU website for more information and a link to the app. We are excited to see how this works so please let us know what you think.

As stated above, the public really doesn't know we exist. We work hard to stay out of the limelight. If we happen to make the news it usually means we've had a problem. It's time to change that. During my day job as the Section Manager of Orem City's Wastewater Section, I have the privilege of hosting tours at the Water Reclamation Facility. I am continually amazed by the fact that people have no idea what happens to the water that goes down the drain. Most of our residents have no idea that our systems run 24 hours per day, 365 days per year, without interruption and no shut down. Our messages are starting to get out.

There have been a couple of great news stories the past few months showing what is dealt with on a daily basis in our collections systems and treatment plants. In August, Jill Jones, District Manager of Central Davis Sewer District, along with members of the Wasatch Front Water Quality Council made a presentation to the legislature interim committee on the issues of 'flushable wipes'. Facilities across the Wasatch Front are hosting tours for your local representatives in the Utah legislature. We ARE getting the word out and decision makers are starting to listen. Let's keep up the forward momentum. Don't hesitate to share with others the importance of what you do.

In closing, I would like to share with you a story from a good friend who works in our industry. He has a family member that spent some time in Ghana. When he got there, he called his father and thanked him. He said, "I now know why you have such a passion for the work you do." You see, Ghana has raw sewage that flows down the streets and clean drinking water is hard to find. On that note, be proud of the job you do and the service you give to our communities. 

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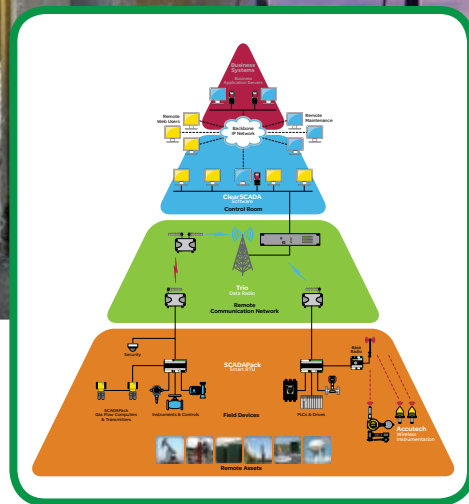
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Astrophysics to a Sophomore

Bryan Mansell

I recently overheard my eight-year-old son explain to my six-year-old daughter where the sun goes when it sets. "It looks like it's going away" he said, "but it's actually lighting the other side of the earth, because the sun goes in a circle around the earth." My ears perked up when I heard his innocent, highly sophomoric explanation. He was quite certain that's how it works. My wife and I let him finish, and then lovingly caught him up on centuries of astronomy (or at least the parts we think we know). At first, he was confused, but eventually caught on to the idea of a heliocentric solar system. My six-year-old, on the other hand, decided she wasn't that interested and went back to nasal excavation.

I'm sure you've had experiences like this – overhearing hilarious conversations between children about conclusions they reached based on a conglomeration of what they learned from other kids, terms they heard their parents say, and something they saw on TV. It always makes me laugh as well as wonder how often we as adults form, share, and even defend opinions about which we may have very limited understanding. I think most of us do it all the time. After all, there's simply not enough time to have a sound understanding of every topic that comes up at the dinner table, even with Wikipedia. Besides, understanding requires patience and listening to all the

aspects of an idea, which can be challenging when our pride insists 'no, the sun goes in a circle around the earth'. So, next time your neighbor or relative gets into a topic that boils your blood, consider whether the depth of your understanding truly matches the depth of your feelings on the matter. If not, then you're wandering into enthusiastic sophomorphism. Better to consider all sides of a cylinder before concluding that it's a circle or a rectangle.

On that note, I'm sure there are things you can learn from your peers in the industry during the upcoming Mid-year Conference in November that will help you have a more comprehensive understanding of many different topics. Come and find out. [\[M\]](#)

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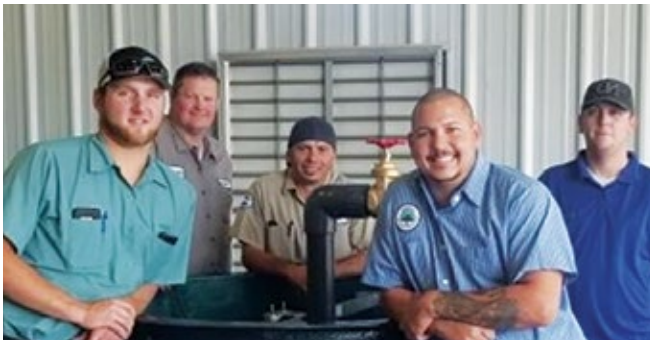
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Good Luck to Our Teams

By Clay Marriott, PWO Representative

Wow, how time flies when you are having fun. I would like to thank all of the entities that are supporting the operations challenge teams going to WEFTEC in Chicago, IL. We have two great teams going to represent Utah and WEAU: Central Valley and the Wasatch All Star team. We have been fortunate to have the support of WEAU and have been very successful as a state at the national level. Several of the reasons for this are great leaders and opportunities to learn from trainings, other events and conferences. We need to support and take advantage of the

educational opportunities we have to improve as operators and better our place of employment. Together, these opportunities lift all of us and make the environment a better place. The 2019 Midyear Conference is coming up on November 19th and we have some great things planned with great learning opportunities. I encourage all of us to go and participate. If you get the chance to be in Chicago, come find the Operations Challenge venue and come cheer on and support our teams. Good luck to Central Valley and the Wasatch All Stars. [DN](#)



Wasatch All Stars 2019



Central Valley Wasted Gas 2019

2020 Operations Challenge Kickoff Meeting

December 11, 2019 at 11:00 am
Central Valley Water Reclamation Facility
800 West Central Valley Road
Salt Lake City, Utah 84119
Please RSVP to tanderson@ndsd.org

What is Operations Challenge?

Each day operators and technicians operate treatment facilities, problem-solve, respond to emergencies, and perform analyses related to wastewater treatment and collection systems. Yet, only few get to witness the behind-the-scenes work performed everyday by our state professionals.

The WEAU Operations Challenge is a fun and exciting event designed to highlight the extensive knowledge and breadth required of wastewater operators and technicians. Teams for the challenge consist of four members who compete in five events: Operations Process Control, Laboratory, Safety, Maintenance, and Collections Systems.

We are seeking new teams and inviting veteran teams to join the fun and come compete in 2020. Operations Challenge can help you cultivate new skills, hone current ones, increase operational knowledge, improve confidence, increase morale and build camaraderie in a safe, fun, and competitive environment.

This is an opportunity to represent your organization in the 'Wastewater Olympics' of our profession.

If your organization plans on sending a team to the 2020 Operations Challenge, please allow one or two representatives to attend the Kickoff Meeting detailed below. Lunch will be provided.

For any questions, please contact:

Tom Anderson, 801-549-8506
Hadley Gunn, 801-633-4374 [DN](#)



A bear of a quiz

Natural Systems

By Paul Krauth

1. Which parameter often tracks with the daily fluctuations of dissolved oxygen in a lagoon system?
 - A. Algae
 - B. COD
 - C. pH
 - D. TSS
2. The ability to volatilize Ammonia increases with ____?
 - A. Increasing pH
 - B. Decreasing pH
 - C. Increasing DO
 - D. Decreasing DO
3. What is the recommended maximum depth of a facultative pond?
 - A. 3 feet
 - B. 6 feet
 - C. 9 feet
 - D. 12 feet
4. What is the predominate algae in the spring in wastewater lagoons?
 - A. Chlorella
 - B. Diatoms
 - C. Euglena
 - D. Microcystis
5. What type of grass can be used to control algae blooms?
 - A. Alfalfa
 - B. Barley
 - C. Rye
 - D. Saw
6. What is the plant that can cause the most issues with algal photosynthesis?
 - A. Azola
 - B. Bulrush
 - C. Lemna
 - D. Phragmites
7. Typical sludge accumulation per capita in a municipal lagoon system is ____?
 - A. 0.1 – 1.0 ft³
 - B. 1.0 – 2.0 ft³
 - C. 2.0 – 3.0 ft³
 - D. 3.0 – 4.0 ft³
8. A healthy pond system in a warm climate in the mid summer can have a DO up to ____ in the late afternoon.
 - A. 5.0 mg/L
 - B. 10.0 mg/L
 - C. 15.0 mg/L
 - D. 20.0 mg/L
9. According to the Ten States standards, the minimum number of ponds required to discharge is _____.
 - A. 1
 - B. 2
 - C. 3
 - D. 4
10. The preferred test for checking organic loading to a lagoon is _____.
 - A. BOD
 - B. CBOD
 - C. COD
 - D. TOC

ANSWERS:
 1-C, 2-A, 3-B, 4-A, 5-B, 6-D, 7-B, 8-D, 9-C, 10-C

Operator Spotlight: Dakody Gines

Dakody Gines works for Snyderville Basin Water Reclamation District as an Engineering Tech. He has been working there for nine years. His career started in maintenance, but he has since moved into the engineering department. Dakody has a Grade Three Collections Certification. With his latest role at Snyderville, he enjoys working with contractors and seeing projects through to completion.

Dakody has participated in the Operators Challenge seven times for WEAU

in St George and one time representing the WEAU All-Stars at the National WEF Competition. Dakody is looking forward to continuing to be a part of the WEAU operators challenge by running For PWO in the coming year. He enjoys boating as a family, with his wife Sabrina and their three little girls, at the local lakes around Kamas. Not a lot of people know, but he has five metal plates and two implants in his face from getting kick by a cow. An item on his bucket list is to go on an African safari hunt. [Dn](#)



How is Your History of Sewage?

1. **The first sewer pipes, developed in the Indus Valley around 2500 BC, were constructed with what material?**
 - A. Clay
 - B. Mud
 - C. Bricks
 - D. Wood

2. **The growth of cities during the _____ quickly led to the over-polluted streets, which acted as a constant source for the outbreak of disease.**
 - A. Dark Ages
 - B. Enlightenment Era
 - C. Roman Era
 - D. Industrial Revolution

3. **When were the first sewer systems built in the United States?**
 - A. 1750s
 - B. 1850s
 - C. 1900s
 - D. 1950s

4. **In which two cities were the first American sewer systems built?**
 - A. Los Angeles and Houston
 - B. Boston and Richmond
 - C. Chicago and Brooklyn
 - D. Washington DC and Atlanta

5. **Historically, sewage treatment focused on the conveyance of raw sewage to where?**
 - A. Water treatment facilities
 - B. Cisterns
 - C. Septic systems
 - D. A natural body of water

6. **India and Pakistan have had settlements with sophisticated sewage systems complete with drainage channels, rainwater harvesting and street ducts as far back as 2500 B.C.**
 - A. True
 - B. False

7. **The first flush toilets date back to what century?**
 - A. 16th century
 - B. 17th century
 - C. 18th century
 - D. 19th century

8. **When were clay pipes introduced?**
 - A. 4000 BC
 - B. 5000 BC
 - C. 6000 BC
 - D. 7000 B.C.

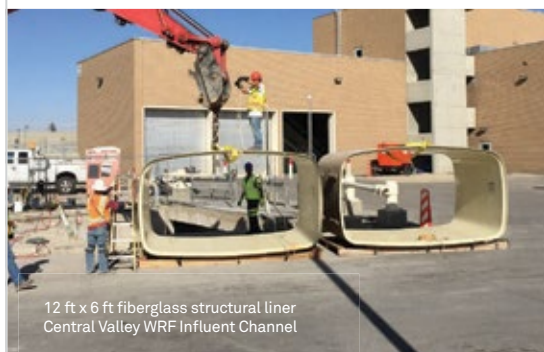
9. **Prior to the industrial era people relied on _____ to remove sewage from the streets.**
 - A. Night soil men
 - B. Rain
 - C. Hoses
 - D. Channels

10. **Early clay pipes had detachable and replaceable segments that allowed for cleaning.**
 - A. True
 - B. False

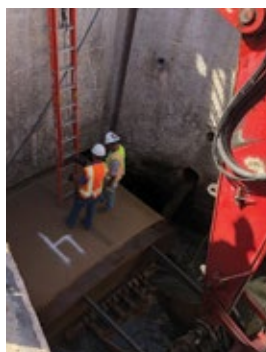
Brought to you by EnviroSight, www.blog.envirosight.com/whats-your-sewer-iq-take-our-sewer-history-quiz

ANSWERS:

ANSWERS: 1-C, 2-D, 3-B, 4-C, 5-D, 6-A, 7-C, 8-A, 9-B, 10-A



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Sampling Terms

By Brett Nelson

Below are some quick definitions of common terms for self-monitoring purposes. These terms may have other meanings, and these definitions are not to be used to interpret your permit or authorization.

Discharge:

The material being sent to the sewer or the act of sending flow to the sewer.

Grab Sample:

An individual sample collected at a specific time. 'Grabs' are generally collected manually using an appropriate collection vessel. Grab samples are used when you need to take a measurement or preserve the sample shortly after collecting it. Some pollutants cannot be held for long periods of time. Routine samples that are collected by grabs include pH, cyanide, volatile pollutants, and fats, oil and grease (FOG).

Aliquot:

A measured portion of an individual sample.

Composite Sample:

Portions of several grabs blended together for analysis. Composite samples provide a better representation of the discharge, especially if the concentrations of the pollutants might change over the

collection period. There are two ways to collect composite samples:

- In a *time-proportional composite sample* (Aliquots taken at regular time intervals – for example, every 15 minutes). For self-monitoring, a time proportional composite sample is four or more aliquots of equal volume collected no sooner than 15 minutes apart and no more than two hours apart throughout the processing day.
- In a *flow proportional composite sample* (Aliquots taken at intervals measured by volume of flow). The frequency of sampling is based on the volume of flow at the time of collection or the total flow since collection of the previous sample.

Sample Frequency:

How often a company needs to collect samples while discharging flow to the sewer. This can be required on a daily, weekly, monthly, semimonthly,

quarterly or annual basis. Your permit or authorization specifies the frequency for sample collection. Here are a few examples:

- Weekly Composite Sample – a composite sample collected in one 24-hour period once per week.
- Weekly Grab sample – a grab sample collected once per week.
- Monthly Composite Sample – a composite sample collected in one 24-hour period once per month.
- Monthly Grab Sample – a grab sample collected once per month

Representative Sample:

A sample that reflects the discharge throughout the sample collection period. Collect samples when your business is discharging waste to the sewer during routine operation. If your business discharges only at certain times of the day, be sure to sample at those times. If your business has no flow to sample, report no discharge. There is no need to create flow just to measure it. [DN](#)



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WEAU 2019 **MIDYEAR CONFERENCE**

NOVEMBER 19, 2019

8:00 AM—4:00 PM

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REGISTRATION

Please complete registration before October 31, 2018 for the best rates. Registration information is available at www.wEAU.org. A continental breakfast and lunch are provided as part of the registration.

2019 WEAU PLATINUM SPONSORS



CONFERENCE SCHEDULE

TIME	EVENT
8:00-8:30	Registration and Continental Breakfast
8:30-10:00	Morning Sessions
10:00-10:20	Break
10:20-11:50	Late Morning Sessions
12:00-1:20	Lunch and Keynote Speaker
1:30-3:00	Afternoon Sessions
3:00-3:20	Break
3:20-4:00	Late Afternoon Sessions
4:00	Return Lanyards and Prize Drawing



WEAU is going mobile with a conference app! We are teaming with CrowdCompass to build an app that will make this year's conference experience a lot more valuable for attendees, speakers, exhibitors, and sponsors. This app will include networking, schedules, social media and much more at the palm of your hand. Our app will soon be live. Stay tuned for the release details and more info on how you can use the app to enhance your conference experience.

PRELIMINARY TECHNICAL SESSION LISTING

SUSTAINABILITY, GHG EMISSIONS	WW FACILITY PLANNING, MODELING, AND DESIGN	OPERATIONS	COLLECTIONS
Great Salt Lake - What is the Future and Can It Be Saved? Leland Myers - WFWQC	Sustainable Return on Investment Analysis of the New Salt Lake City WRF Andrea Bohmholdt - AECOM	Wastewater Intensification - Here to pump you up! Clint Rogers - Stantec	There Can Only be One: Selecting IPS Location and Influent Sewer Conveyance Alignment Alex Christensen - AECOM
Comparison of Harmful Algal Blooms in Western U.S. Lakes and Utah Waterbodies Renn S. Lambert - LimnoTech	How to Select the Right MBR System for You Nathan Antonneau - Archer Western Construction	Process Control Strategy Bryan Lamar	Pump Station Preventative Maintenance Blaine Bowden-Snyderville Basin WRD
Separating and Chemically Drying Biosolids With Sulfites/Bisulfites Reduces Green House Gas Emissions and Provides More Efficient Wastewater Treatment Marcus G. Theodore - Earth Renaissance Technologies	Physical Model Study Considerations Rebecca Yoo - Brown and Caldwell	Operations Challenge Test Taking Tom Anderson	What's That Smell? Odor and Corrosion Mitigation in Salt Lake City Emma McGowan - Jacobs
FINANCING	PROCESS CONTROL	Jar Testing 101	Syneco Systems, Inc: Odor & Corrosion Control Made Easy
Working Together to Demonstrate Strength and Obtain WIFIA Funding Amy Broughton - Stantec	Aeration Basin Control Strategies Henryk Melcer - Brown and Caldwell	Paul Krauth - Statepoint Engineering	Dan Falkman - Syneco Systems, Inc.
SAFETY	Saving Energy and Money Through Better Wastewater Treatment Plant Mixing Michele Braas - Xylem, Inc	NUTRIENT REMOVAL	Update and Case Studies on Acoustic Transmissive Assessment of Collection Systems Condition
Will Your Organization be Prepared for a Major Earthquake? Brian Child - Olympus Insurance	Michele Braas - Xylem, Inc	Chemical Phosphorus Removal - Utah Jar Test Studies Jeff Zidek - Thatcher Company	Jon Borden-RH Borden and Company
PROJECT DELIVERY	OTHER	The Day I Took Control of My Struvite Problem, or The Benefits of a Whole Plant Phosphorous Balance	Perfect Products Design & Application
How to Select the Best Project Delivery Model for You Brad Sanders - Archer Western	Student Presentation TBA	Rick Kelly - Brown and Caldwell	Max Cikerle - Schlüsselbauer/ Geneva Pipe
		The Secrets and Challenges of Achieving Low Nitrogen Effluent Limits Chris Machado - Stantec	

The content of the technical program is subject to change. Visit weau.org and the mobile conference app for updates.

2019 MIDYEAR CONFERENCE



Flushable Wipes: Utah's Three Million Dollar Problem

Utah State Legislators received an education on the importance of only flushing the three Ps – Paper, Pee and Poo and the real cost of 'flushable' wipes on Utah's sewer systems

By Hilary Robertson

Each year Utah spends an excess of \$3 million, not counting the additional costs to residents from sewer line back-ups, to repair the damage caused by flushable wipes.

The Wasatch Front Water Quality Council, a group of wastewater treatment plants from across the Wasatch Front, met with the Utah State legislators and discussed the need for a coordinated public education effort about the problems flushable wipes cause, the cost to municipalities and homeowners, and voluntary actions that can be done to prevent more significant issues in the future.

"We want the public to know the importance of only flushing the three Ps – (toilet) paper, pee and poo," said Leland Myers, Executive Director of the Wasatch Front Water Quality Council. "Flushing materials like wipes, feminine hygiene products, and diapers create costly problems for wastewater treatment plants and expensive backups for homeowners that are not only messy but dangerous to your health. We need people to change their habits now before things get worse and we need to look at legislative action."

Nationwide, states are starting to take action to regulate the use of wipes. Washington DC passed legislation in 2016 to ban the

use of the word 'flushable' on wipe labels and New Jersey and California are proposing similar laws.

Disposing of wipes and other non-flushable materials down the toilet creates a significant problem for municipal sewer systems. Pump screens – filters used in wastewater treatment plants that remove objects from wastewater before it continues through the cleaning process – are not equipped to process these materials and wipes get stuck, causing equipment malfunctions that result in costly maintenance and repairs.

"The flushable wipe industry is a \$2.1 billion industry and it's expected to grow by nearly 67% in the next five years," said Jill Jones, District Manager for Central Davis Sewer District. "The more people are using these products and flushing them down the drain, the greater the cost will be for wastewater treatment plants to process them. These increased operating costs will likely result in higher utility fees for residents. It can be an awkward topic to talk about, but with a little humor (like our three Ps message) we hope people will become educated and start to be more aware of what they are putting down the toilet." [DN](#)

The WFWQC Unrolls Flushable Wipes Campaign

By Manjot Masson

The Wasatch Front Water Quality Council (WFWQC), a coalition of POTWs along the Wasatch Front, presented to the Public Utilities, Energy, and Technology Interim Committee at the State Capitol on August 21, 2019. The topic of the presentation was "Flushable Wipes in Sewer Lines and Water Treatment Plants."

In other words, Flushable Wipes in your pipes. The presentation was made by the General Manager of Central Davis Sewer District, Jill Jones. Ms. Jones started the presentation by educating the room on the harmful impacts of wet wipes on the sewer infrastructure. Wet wipes do not break down and even the ones that rip apart may end up weaving back together in the sewer lines creating fatbergs when they combine with fats oils and grease or possibly damaging mechanical pumps or other equipment. The wipes not only are harmful to the sewer systems but may also damage the environment due to overflows when they prevent the sewer system from operating effectively.

The wet wipe market is estimated to be a \$2.1 billion industry as of 2018; however, the cost of the wet wipe industry to the sewer infrastructure just in the state of Utah is estimated to be three million dollars per year. Ms. Jones indicated that many states are looking at laws that would bring to light that flushable wipes do not readily biodegrade in the sewer system. Although the WFWQC is not seeking legislation at this time, it is starting a public relations campaign to raise awareness of the damages caused by wet wipes. The public relations campaign would encourage citizens to use a trash can for non-readily biodegradable material. The only things that should be flushed is pee, poo, and paper, and that's it. So, remember before you rush to flush, it's only pee, poo, and paper, and that's it.

For an entertaining explanation of wet wipe problems, you may want to look at the video at this address: www.youtube.com/watch?v=XFB46km7bo. Legislators were both grossed out and entertained. Maybe you will be too. [DN](#)

			Wastewater & Water treatment Specialist				
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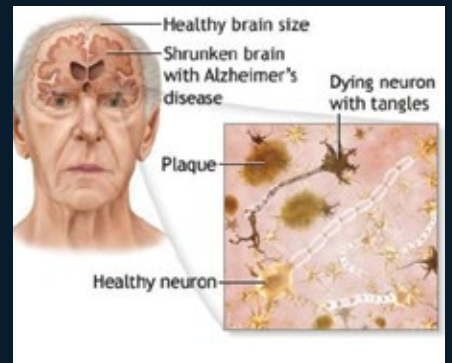
recent article in New Scientist titled 'The Hidden Cause of Disease' explores the idea that "The diseases most people die of have been attributed to unhealthy lifestyles.

But evidence now suggests bacteria are to blame, heralding a revolution in medicine."¹ This is revolutionary thinking and for most people, too far out there. I understand that it may sound complicated or even simplistic, but that may be the beauty of it. The simplest explanation is usually the best and when the answer is too complex, the teacher is usually 'culling the herd' or really doesn't understand the concept that well themselves.

**BY
KEN BURGNER**

This can't be truer than in the case of understanding the Human Microbiome. The current Human Microbiome Project, like the prior Human Genome Project, is revealing much information about us humans that has never been understood. "For decades, health experts have been

lecturing us about our bad habits, blaming them for the surge in 'lifestyle diseases' like diabetes, stroke, and Alzheimer's. Too much red meat, too little fruit and vegetables, smoking, drinking, obesity, and not enough exercise appear to make all these diseases more likely.



Source: www.factfile.org/10-facts-about-alzheimers-disease

But no one really knows why, and we still haven't worked out what causes any of them. Until now, bacteria's involvement completely eluded us. But now DNA sequencing has revealed bacteria in places they were never supposed to be, manipulating inflammation in just the ways observed in these diseases. Some researchers, frustrated by years of failure to find causes, and therefore real treatments, for the diseases of ageing are cautiously excited. And with reason: this could change everything."¹

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“Our understanding of the link between the human microbiome and disease, including obesity, inflammatory bowel disease, arthritis, and autism, is rapidly expanding.”² These are quotes from just a couple of recent articles.

Mind altering concepts, right? But what on earth does it have to do with wastewater and ‘Bacteria, Protozoa and Metazoa’. Good question.



Source: www.medicalxpress.com/news/2019-08-gene-therapy-obesity-reverses-diabetes.html

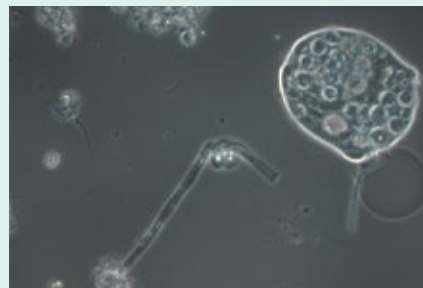
It is hard to find an accurate count of the number of Water Resource Recovery Facilities (WRRF) there are in this country, but it would seem to number around 16,000. (If you have a more accurate number I would love to hear it.) The EPA published this about the volume of water and it’s a lot. “Wastewater treatment facilities in the United States process approximately 34 billion gallons of wastewater every day. Wastewater contains nitrogen and phosphorus from human waste, food and certain soaps and detergents.”³



My point is that, each stream, river, lake, wetland and WRRF, not only possesses their own ecosystem, but their own microbiome. As the technology has increased our own ability to understand this has increased as well. So we can perform genomic analysis of each human, each stream, each river, each lake, each wetland, and each WRRF. Also, may I say, each process within a facility? As we do this we may better

understand the microbiome of each WRRF and why we don’t always get the same outcome when we seemingly follow the same procedure/process and get different results.

Within the limitations of the accuracy of most analytical methods that we are forced to follow, this might provide an explanation of why two WRRF can have similar waste streams with similar concentrations of BOD, TSS, and Toxicities and have completely different results when the effluent is analyzed. Same food, but a different cast of characters, largely the bacteria, are consuming and metabolizing the food differently.



In the same way, the protozoa and metazoa are then feeding on bacteria that may be similar, but are actually different, based on nutritional value, genetic type, and the process you are using and testing from. Therefore, if we are looking for the cause of an illness in the process, the cause may be as simple as not having the right bacteria to treat a new waste stream. In the case of the nitrifiers, it may take weeks to months to develop sufficient populations to treatment your volume of sewage, but they will develop. The organisms are

there; they just need to build a suitably large population.

The current accepted technologies to test for these types of organisms can take weeks to months, as well. However, with genomics we can follow these changes in days.

Just one example. Our WRRF we are required to analyze five times a week for E. coli and a limit of 126, Average Monthly and 157, Average Weekly, based on No./100mL. This is still a difficult parameter for some facilities to meet. Using genomic testing, we found only one species of identifiable E. coli, but nearly 2100 total species of identifiable bacteria. Imagine understanding what that really means to the receiving body of water.

What does it all mean? Just that if you work out and you don’t get the same result as someone else there may be an explanation if we could understand your microbiome. Diabetes may be in your family, but why did you get it and your sister didn’t. The same goes for a WRRF. If you don’t get the same results at your facility as the same plant elsewhere gets, maybe understanding the treatment plants microbiome may help you out. In a future article, we will expand on this and more about the protozoan and metazoan connection.

¹ www.newscientist.com, New Scientist Ltd, Registered Office: 25 Bedford Street, London, WC2E 9ES.

² www.nature.com/articles/nm.4517

³ www.epa.gov/nutrientpollution/sources-and-solutions-wastewater 

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By Michael Arceneaux and Jennifer Lyn Walker

Cybersecurity Fundamentals

Water and wastewater utilities provide critical lifeline services to their communities and their regions. Supporting these vitally important functions requires secure information technology (IT) and operational technology (OT), yet the sector's IT and OT networks continue to face an onslaught of threats from cyber criminals, nation states, and others.

To support the sector in its cybersecurity goals, and in response to the continually evolving threats, WaterISAC, the Water Information Sharing and Analysis Center, has just published a newly updated resource: *15 Cybersecurity Fundamentals for Water and Wastewater Utilities*.

The updated guide contains dozens of best practices, grouped into 15 main categories, that water and wastewater systems can implement to reduce security risks to their IT and OT systems. Each recommendation is accompanied by links to corresponding technical resources. In sum, the guide connects users to the information and tools needed to take a dive deep into this important issue.

Here is a summary of the 15 fundamentals:

- **Perform asset inventories.** You can only protect what you know about. Knowing your environment is a basic requirement of a sound cybersecurity program.
- **Assess risks.** Once assets inventories are completed, OT and IT risk should be assessed, considering the likelihood a threat will occur and the degree of impact the threat will cause to the organization.

- **Minimize control system exposure.** Protect the control system environment from outside, untrusted networks. This involves network segmentation, traffic restrictions, and encrypted communications.
- **Enforce user access controls.** Users on a network should have no more access than they need to do their jobs. Apply role-based access controls and the principle of least privilege, including limited use of administrator rights to prevent users from accessing systems and files they are not authorized to access.
- **Safeguard from unauthorized physical access.** If an adversary can gain physical access to your equipment, they can compromise it. Non-technical, physical security controls can restrict physical access to IT and OT environments.
- **Install independent cyber and physical safety systems.** Cyber-attacks can result in physical effects. To protect critical assets from such "blended" threats, utilities should consider non-digital engineering solutions such as independent cyber and physical safety systems.
- **Embrace vulnerability management.** Largely informed by asset inventory and risk assessments, vulnerability management involves the need to identify and remediate cybersecurity gaps and vulnerabilities before the bad guys exploit them.
- **Create a cybersecurity culture.** Cybersecurity is everyone's responsibility, the break room to the boardroom. Effective cybersecurity starts at the top; to affect positive behavioral changes, involve every executive, board member, and employee in cybersecurity awareness and training.



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- **Develop and enforce cybersecurity policies and procedures (governance).** Create, disseminate, and operationalize clear and actionable organizational policies and procedures regarding cybersecurity expectations. The fundamentals in this guide can be used to begin developing policies that are most relevant to each organization.
- **Implement threat detection and monitoring.** You will not find it if you are not looking. The importance of configuring detailed logging and reviewing system logs to detect active threats in your environment cannot be overstated.
- **Plan for incidents, emergencies, and disasters.** Plan ahead for maintaining business continuity and resilience. Emergency response plans (ERPs) will be required by America's Water Infrastructure Act (AWIA) beginning in 2020.
- **Tackle insider threats.** The insider threat is a people problem, not a technology problem; however, not all insider threats are malicious. Mitigate this organizational-level threat by

understanding behavioral indicators that predicate an insider threat and apply appropriate training and technology controls to deter an incident.

- **Secure the supply chain.** The supply chain/vendor relationship is a common threat vector for cyber-attacks and must be intentionally managed through security and vulnerability testing and risk assessments.
- **Address all smart devices.** When unsecured, internet of things (IoT) and mobile devices are connected to networks, they create holes (often to the Internet) that may not have previously existed. Cisco's 2018 Annual Cybersecurity Report states that few organizations view IoT as an imminent threat, yet adversaries are exploiting weaknesses in connected devices to gain access to industrial control systems that support critical infrastructure.
- **Participate in information sharing and collaboration communities.** Share information with others. Utilities can learn from each another by getting involved in WaterISAC, InfraGard, and

similar communities. Cyber-mature utilities can significantly help the community and sector by sharing their experiences.

About WaterISAC

WaterISAC is a nonprofit water and wastewater sector organization dedicated to protecting sector utilities from all hazards. WaterISAC disseminates threat advisories, reports, and mitigation resources to help utilities prevent cyber and physical security incidents and to recover from disasters.

WaterISAC draws information from federal and state law enforcement and many private sector sources to produce products that are relevant to the water and wastewater sector.

Membership, including a free 60-day trial, is open to utilities, consulting firms, sector associations and state agencies. More information is available at www.waterisac.org.

Michael Arceneaux is WaterISAC's managing director and **Jennifer Lyn Walker** is WaterISAC's cybersecurity risk analyst. [DII](#)

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Patrick Dube

Thickening and Dewatering 101

WEF Releases 10 Thickening and Dewatering Factsheets

Recently, the Solids Separation Subcommittee of the WEF Residuals and Biosolids Committee began development on 10 factsheets focusing on biosolids thickening and dewatering. This preview examines the first set, titled, *Thickening and Dewatering, Polymer/Flocculants 101*, and *Solids Capture in Dewatering Processes*. These factsheets can be downloaded by visiting www.wef.org/factsheets.

Thickening and Dewatering

In the wastewater treatment process, solids get separated via settling in primary and secondary clarifiers and need to be further processed before moving down the treatment train. Thickening and dewatering of solids helps reduce the volume of the material in the system. Less volume benefits utilities by enabling smaller downstream facilities, which reduce energy and operating costs.

Thickening typically occurs after solids have been discharged from clarifiers but before digestion or storage. Depending on the facility and characteristics of the solids, various types of equipment can be used to thicken the solids, including (but not limited to) gravity thickeners, centrifuge thickeners, and rotary drum/screw thickeners. After thickening, the solids can range from 2% to 8% solids concentration and can be pumped throughout the facility.

Dewatering typically occurs after biological and digestion processes and further removes water from the solids slurry. This process produces a material that can be transported for disposal or beneficial use. The solids cake that is produced from dewatering is typically 15% to 40% solids and acts as a solid – meaning it no longer can be pumped.

The benefits to dewatering are similar to those of thickening: Reducing the total volume of material reduces transportation

costs and the size of equipment (incinerators, digesters, drying beds) needed downstream. Dewatering typically is done using belt filter presses, screw presses, centrifuges, and other dewatering specific equipment.

Polymer/Flocculants

To maximize thickening and dewatering efficiencies, polymers and flocculants often are used. These chemicals help clump, or flocculate, solids together and make water easier to remove.

Polymer comes in three forms: dry, solution, and emulsion. Dry polymer consists of 90% active polymer and requires a more extensive process to dissolve and activate it before use. Solution polymer, also called Mannich, is a viscous polymer with only 4% to 8% active ingredient. Its low activity and difficulty in pumping has caused it to be less used in today's water resource recovery facilities. Both polymers must be activated and diluted on-site to between 0.1% and 1% active solution before using. The dilution process must be followed meticulously to prevent damaging the polymer and reducing its efficiency, and, thus, leading to a greater polymer demand, which increases costs.

Emulsion polymer is a pumpable polymer of gel emulsified in hydrocarbon oil with 2% to 55% activity. Due to its pumpability, it often is delivered to the system in-line, although its ease of use and higher activity come with a higher cost when compared to dry polymer.

Solids Capture

Integral to optimizing biosolids efficiency and costs is paying attention to solids capture. This parameter is the amount of solids that are discharged, based on the percentage of solids in the feed. While the industry standard is 95%, on-site performance can get as low as 60%.

Low solids capture means a significant portion of solids are being returned to the head of the facility with the extracted water. By increasing solids capture, you reduce costs associated with re-treatment, prevent excess wear and tear on equipment, and help improve overall facility performance.

Solids capture percentage can be determined using an equation (outlined in the factsheet, *Solids Capture in Dewatering Processes*) that incorporates sludge flow, washwater and polymer water flow, discharge cake, feeds solids and filtrate, or centrate solids. Establishing a baseline enables improvement to be measured.

To improve solids capture, a step-by-step approach is advised. First, identify all settings and parameters used in the dewatering process (feed solids, flow rate, cake solids, polymer flow, etc). Then change one setting at a time; let it reach steady-state, and evaluate the effect on solids capture.

More Information Available

Thickening and dewatering biosolids is an intricate topic. This article only touches on a few of the important considerations with polymer/flocculants and solids capture. For a more in-depth discussion of these topics and more, visit www.wef.org/factsheets to see all of the thickening and dewatering factsheets as well as factsheets on many other topics.

Dr. Patrick Dube is a technical program manager in the Water Science & Engineering Center at the Water Environment Federation (Alexandria, VA). He manages the Residuals and Biosolids Committee and the Air Quality & Odor Control Committee. He can be contacted at pdube@wef.org. 



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Lisa Dirksen

Reimagine Credentialing with the Professional Operator Program

Two letters after a name can have a big impact on a career – just look at the RN or PE. Those designations add a level of credibility to the professional, impact their pay scale, and show they have the knowledge necessary to perform their jobs to the best of their ability.

With the support of the American Water Works Association (AWWA) and the Water Environment Federation (WEF), the Association of Boards of Certification (ABC) recognized the need for a similar designation that gives water and wastewater operators credit where credit is due.

Operators are front line protectors of human health, either through ensuring safe drinking water or the safety of waterways through effective wastewater management. They are the lifeblood of every community and deserve a way to be showcased as professionals. And so – built by operators for operators – the Professional Operator (PO) program was born.

Join the Community

POs are an elite group of like-minded individuals, deeply committed to serving the public and growing in the industry. Having a supportive community for sharing industry knowledge is absolutely invaluable. The designation opens doors for international networking, connects operators with opportunities to be industry advocates, and qualifies operators to attend some fun industry events along the way.

Grow as a Professional

Becoming a certified PO signals to employers that the operator is an achiever – committed to their profession long-term and ready to go above and beyond.

“I became a Professional Operator because of the chance to test my knowledge and accelerate my career,” said Brian Faist, Professional Operator in Rivergrove, OR. “The PO designation has made me a more appealing candidate for promotion.” Whether looking to grow within a company or trying to find a job, being a PO makes the operator stand out in a crowd.

Ensure Accountability

The PO program is the first internationally recognized professional designation for water and wastewater operators. With the designation, peers, customers, and the public can feel confident that a Professional Operator has mastered the most rigorous standards of their vocation and industry.

“I wanted a challenge and I tackled it,” said Georginna Lockett, Professional Operator in Atlanta, GA. “Being a PO certifies me in the industry as a top-level operator and that has been my goal since I started in the field.”

All POs must also adhere to a code of conduct, which bolsters an operator’s reputation and builds additional community trust.

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Increase Mobility

Industry adopters of the PO program are continuing to grow and it's helping to mold an expansive future for operators.

"Broad acceptance of a standard certification can make water professional credentials portable across state or country lines," said Paul Bishop, President and CEO of ABC. "With many benefits and potential solutions also come some challenges, but industry leaders at WEF, AWWA, and ABC are up to the task."

The PO program is a great leap toward an industry credential standard. It includes uniform and transparent credentialing that is recognizable by any employer or certification body.

Begin Your Journey

PO certification is offered to operators in four levels (from Class I through Class IV) for water treatment, water distribution, wastewater collection, and wastewater treatment. Joining the PO movement is simple and the entire process can take as little as a few weeks.

Step One: Create an Online Profile


The path to becoming a PO starts by creating a profile at www.portal.abccert.org. An operator will be asked to add information like work history and education.

Step Two: Submit an Application

The operator submits an application and ABC reviews the operator's profile to ensure basic criteria have been met. Applications are accepted from anywhere in the world, any day of the year.

Step Three: The Exam

In some cases, operators may have already passed a certification exam that ABC will accept. If not, the operator will schedule a time to take an ABC certification exam. Once the exam is passed, the operator will receive a certificate, be invited to a POWER event to be formally recognized, and join the PO community.

For questions or additional information, please visit www.professionaloperator.org or email info@professionaloperator.org. 



The PO program is administered by the Certification Commission for Environmental Professionals (C2EP), an organization of volunteer water environment operations subject matter experts created by the Association of Boards of Certification (ABC).

Graphics of Brian and Georginna at a POWER event (quoted POs):



Brian Faist, PO, from Rivergrove, OR



Georginna Lockett, PO, from Atlanta, GA.

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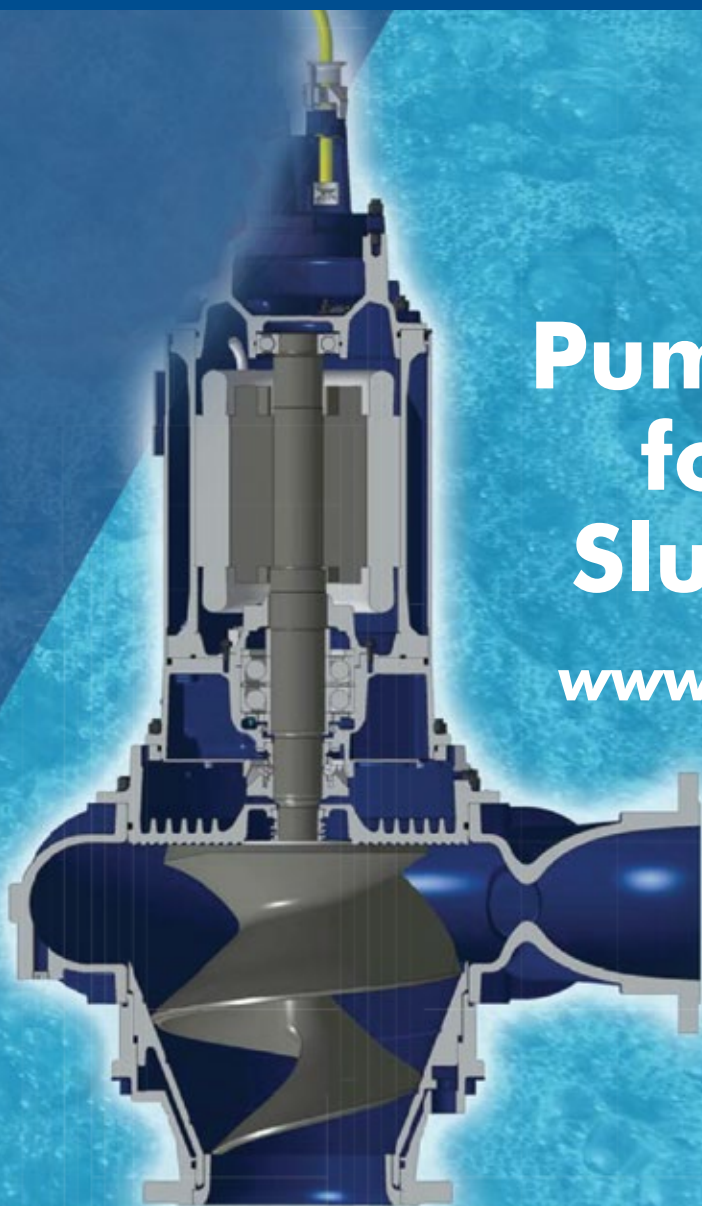
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WEAU Scholarship Application

The WEAU Scholarship Award is available to individuals serving in Utah’s Wastewater field. All applications are reviewed by a WEAU Board appointed panel. The scholarship funds are intended to be used towards the applicants education, trade school classes, education books or student loans. WEAU reserves the right to follow up with the applicant to find out how the funds helped further advance their career goals. The applicant may be requested to write a brief summary of their experience in the Digested News.

Application Requirements and Criteria:

1. Member of Water Environment Association of Utah (WEAU)
2. Currently working/serving in Utah’s Wastewater field
3. Complete and submit the application to weauscholarship@gmail.com

Application Deadline:

October 31, 2019

Award Announcement:

WEAU Mid-Year Conference

Questions contact:

weauscholarship@gmail.com

Application is available at www.weau.org. | **Click ‘Announcements’ under Quick Links**

Macinley Butson from Australia Wins Stockholm Junior Water Prize 2019

By Stockholm International Water Institute

Macinley Butson from Australia has been announced the winner of the prestigious 2019 Stockholm Junior Water Prize. H.R.H. Crown Princess Victoria of Sweden presented the prize at an award ceremony during World Water Week in Stockholm.

Macinley Butson’s project developed a novel and innovative ultraviolet sticker to measure large UV exposures for solar disinfection of water. The SODIS sticker measures the solar UV exposure required to sanitize drinking water through two innovative products built together.

As an elated Macinley received her prize on Tuesday evening, she commented: “There are no words to describe how I am feeling because I can’t process what has just happened. Amazing people have inspired me so much this year and I never expected this outcome. Everyone here is doing so many amazing things, I feel confident the future is in good hands and will never forget the connections I made here in Stockholm.”

In their citation the Jury noted that: “This year’s winning project addresses public health through renewable energy and water. The project embodies simplicity and affordability leaving no one behind. Water for society: including all! This invention is practical, ready and globally deployable. The project demonstrates experience and expertise by a dedicated and creative young scientist.”

Torgny Holmgren, Executive Director of SIWI, was very impressed: “This inspirational project has immense potential for local and global communities. My hope is that this project will act as a catalyst to inspire others both young and old to innovate for new and sustainable ways to access clean and potable water.”

A Diploma of Excellence was awarded to Diana Virgovicova, UK, for her discovery of a New Photocatalyst to Solve Water Pollution. In their citation the Jury stated that Diana Virgovicova has, “solved a long-lasting challenge by opening new windows in using fundamental science, combined with the most recent techniques

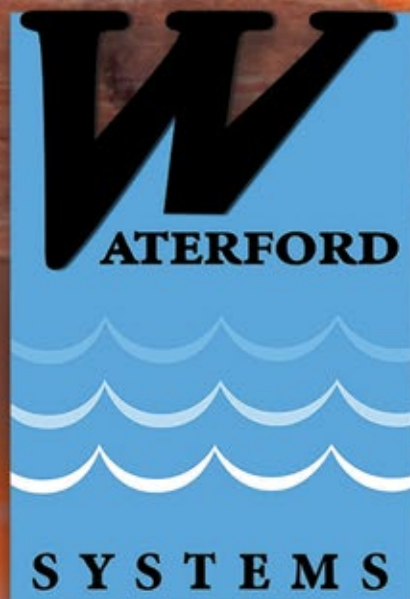


Photo by Jonas Borg

within chemistry to formulate a novel molecule with high potential in promising future water treatment.”

Stockholm Junior Water Prize brings together students from 35 countries. During World Water Week, the world’s leading yearly water event, national winners gather in Stockholm to vie for the international title. The prize is sponsored by Xylem, the Raincoat Foundation and Stockholm Vatten & Avfall. [DIA](#)





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WEAU Biosolids Safety Training

By Mariana Sochanska

WEAU members turned up in force for the August 19th Biosolids Safety Training. This training included an in-depth tour of the new BNR plant followed by presentations at WesTech Engineering. Refreshments and a delicious lunch (who doesn't love Moochies?) were served.

We hope to see everyone out at future trainings! Sign up for the WEAU mailing list by sending an email to membership@weau.org and stay in the loop.

Big thank you to the WEAU Board for sponsoring, the Biosolids Team for organizing (Brian Lamar and Keith Albreetsen), Snyderville Basin (particularly Cody Snyder and Chad Burrell) for providing a tour of their new facility, and all of the presenters (Dan Griffin, Phil Heck, Laura McShane, Dal Wayment, and Ron Daggett). [DN](#)



WEAU YPs Busy as Bees

The following is a summary of our YP updates.

Bees Game

The Bees Game was once again a huge hit (no pun intended). Our crowd of 150+ attendees won more than 50 prizes including a Nintendo Switch, a tool set, and a smart camera set. Everyone enjoyed a dinner, Bees' victory, and fireworks after. Thank you to everyone who attended and the Young Professionals group for planning. We hope to see you there again next year!

Water For People Fundraiser at Midyear Conference

The Young Professionals group will be once again holding a fundraiser for Water For People at the Midyear Conference. Be sure to bring some cash to take home the goodies for a cause.

Young Professionals Dinner and Happy Hour

Join the YPs at Proper Burger for dinner at 5 pm after the Midyear Conference on November 19th. Drinks and games will be next door at Proper Brewing (21+) at 6 pm. All rising consultants and operators who may or may not have attended the conference are welcome! Dinner, games, and aps will be provided by the YP group. [DN](#)



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