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INSIDE:

ReNEW Water Project Measures ■ Midyear Conference Awards and Recognition Summary

Tensar.

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Harley Davidson DCP Case Study

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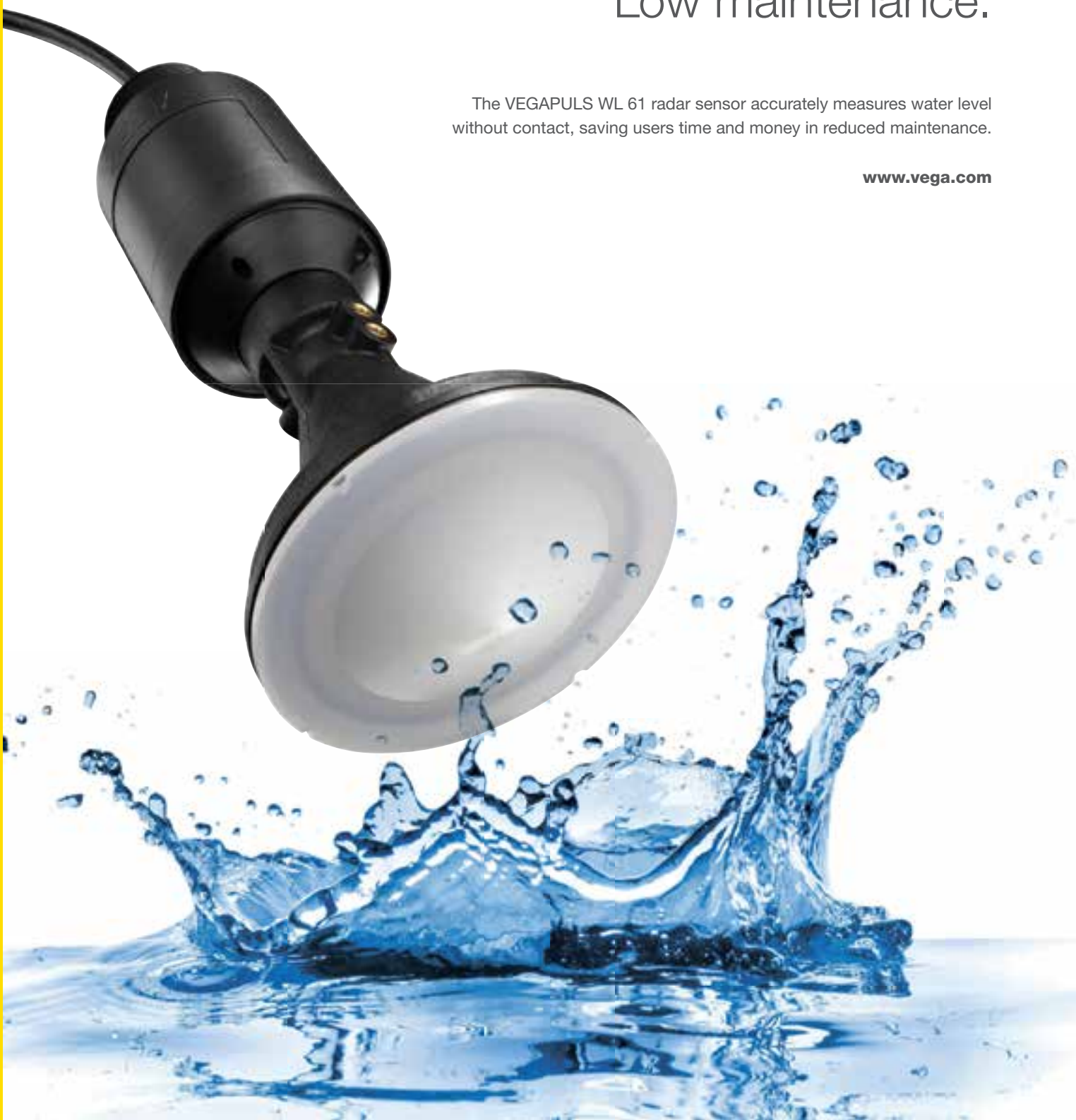

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Seeing the Bigger Picture

Jeff Beckman

I recently heard a story about President John F. Kennedy's visit to NASA in 1962. During this visit, President John F. Kennedy noticed a janitor sweeping the floor. He interrupted his tour, walked over to the man and said, "Hi, I'm Jack Kennedy. What are you doing?"

"Well, Mr. President, I'm helping put a man on the moon," the janitor responded.

To a lot of people, the NASA janitor may have been just cleaning the building. But in the bigger picture unfolding around him, he was helping to make history. The janitor got it. He understood the vision and his part in it, and he had a purpose.

A similar story is the one of Christopher Wren, one of the greatest English architects. One day he was walking, unrecognized, through the men working on the building of St. Paul's cathedral in London, which he designed.

"What are you doing?" he asked one of the workmen. The man replied, "I'm cutting a piece of stone." Then he asked the same question to another man, who replied, "I'm earning five shillings two pence a day."

To a third man he addressed the same inquiry, and the answer he received was, "I am helping Sir Christopher Wren build a beautiful cathedral."

That man had vision. He could see beyond the cutting of stone, beyond the earning of his daily wage, beyond his personal goals, to the creation of a work of art – the building of a great cathedral.

Both of these stories helped me to remember that sometimes we need to take a step back and view the bigger picture. What we do in our industry is much more than just a job or a profession. We are part of a greater team that is helping to improve the environment for those around us and for future generations. As a group of public works operators, managers, engineers, scientist, and more, we all play a key part in accomplishing the goals of WEAU – *to preserve and enhance water quality and the global water environment*.

I see this teamwork throughout the year as we hold conferences, trainings, and other activities. Each of these events would not occur without many hours of dedicated members of the team. So, to everyone that sees the bigger picture and those that help WEAU continue to be a success, I want to thank you for being part of team. On that note, our Annual Conference Committee is actively working towards making the 2019 Annual Conference another great event. So please mark your calendars. The 2019 Annual Conference is scheduled for April 9-12th in St. George. DN

> "We are part of a greater team that is helping to improve the environment for those around us and for future generations.

Jeff Beckman

Technological Advancements Bring Us Together

Chad Burrell

Technology has made great advances in our industry in recent years. We have greatly improved our ability to treat wastewater and do it in an economic and efficient manner. Direct-read monitoring equipment allows us to do constant reading, tracking, and graphing of pollutants in a waste stream. Metering pumps have the precision to inject chemical dosages to be constant, and they are cost-effective. Remote control and remote access to treatment plant controls allows us to respond to alarms, monitor plant status, and make decisions from the comfort of our home, while we sit on the couch, watch TV, and eat chips with one hand with our cell phone in the other.

Technology in the auto industry has done like wise. We drive safer cars that are more efficient, better on the environment and harder to break into. Yes, they are harder to break into and we at WEAU have proof of it! Clint Rogers recently witnessed two WEAU representatives, Rob Jaterka and Chris Reilley trying to break into a truck with a coat hanger. I don't think this has ever been attempted in West Valley so I am glad Clint got some footage. I should clarify – the truck belonged to Central Valley and Chris had accidentally locked his keys in the truck. Regardless of the events leading up to the attempted break-in and to the auto industries credit, Rob and Chris were unsuccessful at making the break-in. This incident was resolved and I highlight two important things:

1. The challenge of breaking into a modern vehicle.
2. The brother/sisterhood that exists within the WEAU organization.

We come together frequently for conferences, trainings, and meeting where we discuss, learn, and share ideas of how to improve what we do at work. However, outside of work we are always willing to lend a hand, or a hanger, in behalf of a fellow member. Keep up the good work, everyone. dn

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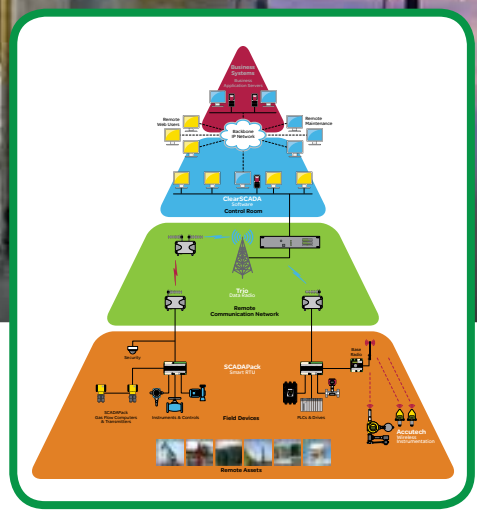

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Present Success and Future Potential

By Jeremy Deppe, PWO Rep.
deppej@cvwrf.org

Well, we just finished another great Midyear Conference and would like to thank all the presenters for their great presentations, organizing committees, and Brandon Wyatt. Brandon is pretty much the Master of the Midyear, and though this is Brandon's last year as the Midyear Committee chair, I am sure this won't be the last we see of him. Thank you Brandon for all that you have done and will do for the WEAU.

We also had a great year at Nationals in New Orleans. Our two Utah teams did very well. Our state champions, Central Weber Vortex, took first in Safety and first in the Pump Maintenance. They ended up 6th overall out of 48 teams in Division II. Next, we had the Wasatch All Stars. They also competed in Division II and finished 3rd out of 48 teams overall. They finished 3rd in the pump maintenance event. Congratulations and thanks to both teams, their entities, Central Valley, North Davis, Orem City, Cottonwood Improvement, Central Weber, Snyderville Basin, and the Board of WEAU for all their support.

We will be having our Operators Challenge Kick Off meeting at Central Valley Water Reclamation Facility on December 6th, at 11 am, so please send your teams. We will be discussing the events, the rules, picking the team numbers, and creating a practice schedule for the equipment. Bring your appetite, as we will be feeding the teams lunch. We hope to see you there.

The Annual Conference Committee is accepting abstracts for presentation at the 2019 WEAU Annual Conference to be held April 9-12, 2019 at the Dixie Center in St. George, Utah. All topics related to water quality, collection, treatment, compliance, utility management, or other related topics will be considered. Please visit *www.weau.org* for more details. DN

Operator Spotlight: Brent Jones

By Clay Marriott

Brent Jones has been a great employee for Orem for over 10 years. Though he was in operations for several years, he has since moved into maintenance and is now a senior maintenance operator for Orem City water reclamation. He says that one of the best things about his job is the involvement of different daily tasks, having the ability to troubleshoot problems, and the excitement of fixing something is not working. He also enjoys his job due to the great colleagues he gets to work with on a daily basis. He says, "the people I work with is what makes my job great."

> "The Operators Challenge has been a great education tool through the opportunity of working with operators from plants all across the state, also to feel a brotherhood and importance of all operators role.

Growing up in Delta, Utah he likes to hunt and fish and has learned how to work hard. He moved to the big city and married his wife Jenni a week after he started working at Orem – that's how he remembers how long he has been married. He enjoys spending time with his wife and two wonderful children Swayzie and Nash, who are seven and four years old. Brent is always helping others out through service. His greatest advice: "Don't be afraid to ask questions, that is how we learn."

Brent participated in the Operations Challenge for the first time in 2018. He competed on a composite team in St. George and felt very excited and honored to represent Orem in the challenge, since they haven't had any participants compete in many years.

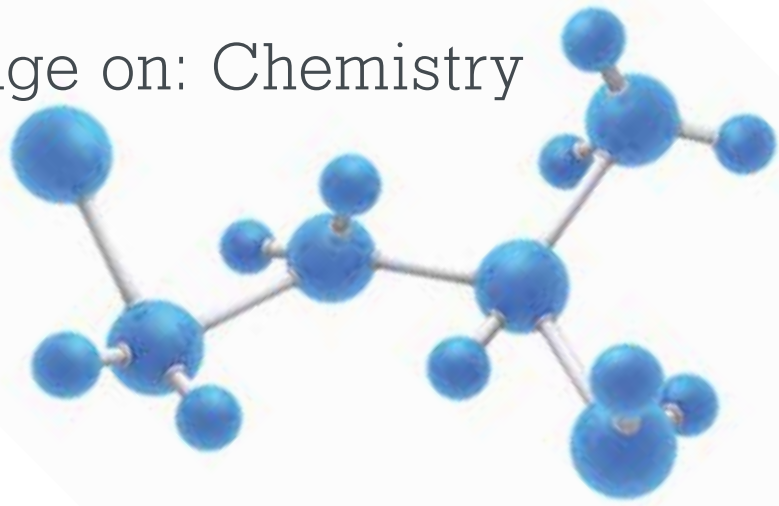
The Operators Challenge has been a great education tool through the opportunity of working with operators from plants all across the state, also to feel a brotherhood and importance of all operators role. Some of the memories of the past year have been learning rules and tasks of the operations challenge, and how to work with others on a team to become one smooth unit. The single best memory for Brent this year was in New Orleans, LA at the WEF Operations Challenge when they announced the 3rd place overall winner.

"The 3rd place overall winner goes to WEAU Wasatch all stars."

Congratulations to the All Star team for their 3rd place overall, and for 3rd place in the maintenance event while competing against over 40 other teams. Congratulations, to Brent for all your hard work, and thank you Orem for the opportunity to get to know Brent Jones through the Operations Challenge the past year. DN

Test your Knowledge on: Chemistry

By Paul Krauth



1. **The definition of pH is _____.**
   A. Log [H^+]
   B. -Log [H^+]
   C. Ln [H^+]
   D. -Ln [H^+]

2. **The definition of pOH is_____.**
   A. Log [OH^-]
   B. -Log [OH^-]
   C. Ln [OH^-]
   D. -Ln [OH^-]

3. **What is the sum of pH and pOH?**
   A. 0
   B. Current acidity
   C. 14
   D. Current alkalinity

4. **A benzene ring consists of _____ atoms.**
   A. Carbon
   B. Hydrogen
   C. Nitrogen
   D. Oxygen

5. **When a molecule loses an electron it said to be _____.**
   A. ionized
   B. oxidized
   C. reduced
   D. stripped

6. **When a molecule gains an electron it said to be _____.**
   A. ionized
   B. oxidized
   C. reduced
   D. stripped

7. **The oxidation-reduction potential is the tendency of a chemical species to _____.**
   A. be ionized
   B. be oxidized
   C. be reduced
   D. be reactive

8. **Which of these acids is the strongest (disassociates) assume all at 1.0 N?**
   A. CH_2O_2
   B. HCl
   C. H_2NO_3
   D. H_2SO_4

9. **A strong acid is indicated by a _____.**
   A. $pK_a < 0$
   B. $pK_a = 0$
   C. $pK_a = 1$
   D. $pK_a > 1$

10. **A strong base is indicated by a _____.**
    A. $pK_a < 0$
    B. $pK_a = 0$
    C. $pK_a = 1$
    D. $pK_a > 1$`

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

Waste Water Process Questions

By Jeremy Deppe

1. **Which of the following affects the UV system efficiency?**
   A. Turbidity
   B. Detention Time
   C. Water Temperature
   D. PH

2. **What parameters are needed to determine organic loading?**
   A. Flow, MlSS
   B. Flow, BOD
   C. BOD, COD
   D. Flow, COD

3. **Fine particle solids that will not settle from wastewater are known as _____.**
   A. Volatile Solids
   B. Suspended Solids
   C. Dissolved Solids
   D. Colloidal Solids

4. **How many pounds of polymer must be added to 30 gallons of water to make a 0.1% polymer solution?**
   A. 1.60 lbs
   B. 0.25 lbs
   C. 0.50 lbs
   D. 1.0 lbs

5. **Which treatment unit is not dependent on bacteria for efficiency?**
   A. Aeration Basins
   B. Oxidation Ditches
   C. Polishing Ponds
   D. Primary Clarifiers

6. **Phosphorus can be found in wastewater as _____.**
   A. Orthophosphate
   B. Polyphosphate
   C. Organic Phosphorus
   D. All of the above

7. **A 250-foot long pipe 12 inches in diameter holds how many gallons when full?**
   A. 196
   B. 1470
   C. 5870
   D. 1640

8. **Grit is washed in order to _____.**
   A. Enhance settleability
   B. Remove organic matter
   C. Remove inorganic matter
   D. Improve filterability

9. **The final product of denitrification is _____.**
   A. Ammonia
   B. Nitrogen Gas
   C. Carbon
   D. Carbon Dioxide

10. **A diaphragm pump is a type of _____.**
    A. Dynamic feed pump
    B. Positive displacement pump
    C. Rotary pump
    D. Centrifugal pump

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

The Air You Breathe

(Submitted by the WEAU Collection Committee)

1. **Engineering controls and respirators are the primary methods for protecting workers from respiratory hazards.**
   A. True
   B. False

2. **There are two major classes of respirators; one is air purifying, the other is _____.**
   A. Atmosphere-supplying
   B. Air-decontaminating
   C. Atmosphere-purifying
   D. Air-contamination

3. **It is the employers responsibility to ensure that their employees are medically fit enough to wear a respirator.**
   A. True
   B. False

4. **Employees who wear eye glasses or contacts lenses are not permitted to use a respirator.**
   A. True
   B. False

5. **What does the phrase "Assigned Protection Factor (APF)" refer to?**
   A. The level of protection that a respirator or a class of respirator is expected to offer
   B. The level of protection that engineering controls and work practices offer against respiratory hazards
   C. The point at which a respirator stops offering any protection to the wearer
   D. The employee to whom a respirator is assigned the protection factor

6. **What does the acronym IDLH stand for?**
   A. Immediately Dangerous to Life and Health
   B. Immediate Detection of Low Hazards
   C. Integrated and Differentiated Level of Hazards
   D. Instant Data List Held

7. **In a Self-Contained Breathing Apparatus, the alarm point indicating depletion of breathing air should be set at a minimum of _____.**
   A. 10%
   B. 15%
   C. 25%
   D. 35%

8. **What does the acronym ESLI stand for?**
   A. Equilibrium Stability Level Isolator
   B. End-of-Service Life Indicator
   C. Emergency Services Listed Incident
   D. Energize Slowly Low Infill

9. **Which of the following air-purifying respirators has an Assigned Protection Factor (APF) equal to 50?**
   A. Half Mask/Dust Mask
   B. A loose-fitting Powered Air-Purifying Air Respirator
   C. Full Face Piece
   D. A hood-powered 50 APF

10. **Which of the following compromises the effectiveness of the respirator's seal?**
    A. Beards
    B. Mustaches
    C. Sideburns
    D. Stubble
    E. All of the above

ANSWERS:

1-FALSE, (ELIMINATE THE HAZARD AND APPLY ADMINISTRATIVE CONTROLS), 2-A, 3-TRUE, 4-TRUE, 5-A, 6-A, 7-C, 8-B, 9-B, 10-E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THE 2018 WEFTEC STUDENT DESIGN COMPETITION PARTICIPANTS

A SPECIAL THANKS TO THE WEAU MIDYEAR PLANNING COMMITTEE

- Brandon Wyatt (Chair)
- Andrew Hobson
- Tiffani Adams
- Tom Holstrom
- Chris Reilley
- Rob Jaterka
- Brent Packer
- Jeremy Deppe
- Clay Marriott
- Josh Hunsaker
- Marianka Sochanska

THE STOCKHOLM JR WATER PRIZE PARTICIPANT AWARD:

Jessica Pratt, Maple Mountain High School, with "Lead Isotope Correlation to Point Source Contamination in the American Fork Reservoir."

2018 WEFTEC STUDENT DESIGN COMPETITION

Project: "Central Valley Water Reclamation Facility, Anaerobic Digestion Analysis," Utah State University.

Team Member Names:

- Dominique Bertand
- Jade Snyder
- Ben Sandberg
- Avery Holyoak
- Todd Keniry
- Ryan Dupont (Advisor)

RECIPIENT OF THE DR. OKEY SCHOLARSHIP AWARD

Rochelle Plaizier (University of Utah)

OPERATOR SCHOLARSHIP RECIPIENTS

Scott Brown (Cottonwood Sanitary District)
Sarah Leavitt (Division of Water Quality)

OPS CHALLEGE TEAMS

- **Central Weber Vortex**
  - Clay Marriott
  - Trevor Creamer
  - Chet Cloward
  - Kevin Draper
- **Wasatch Allstars**
  - Shawn Groberg
  - Todd Smart
  - Brent Jones
  - Devin Sagers
  - Taylor Bryum

STUDENT PRESENTATION AWARD

Brendan Mackey (University of Utah)

KEYNOTE SPEAKER

Marlo Davis (Syderville Basin Water Reclamation District), Ops Challenge through the years. We'd like to recognize Marlo and wife Dawny Davis.

2018 WEFTEC Student Design

Central Weber Vortex

Jeff Beckman

Jessica Pratt, SJWP

Marlo and Dawny Davis

Marlo Davis

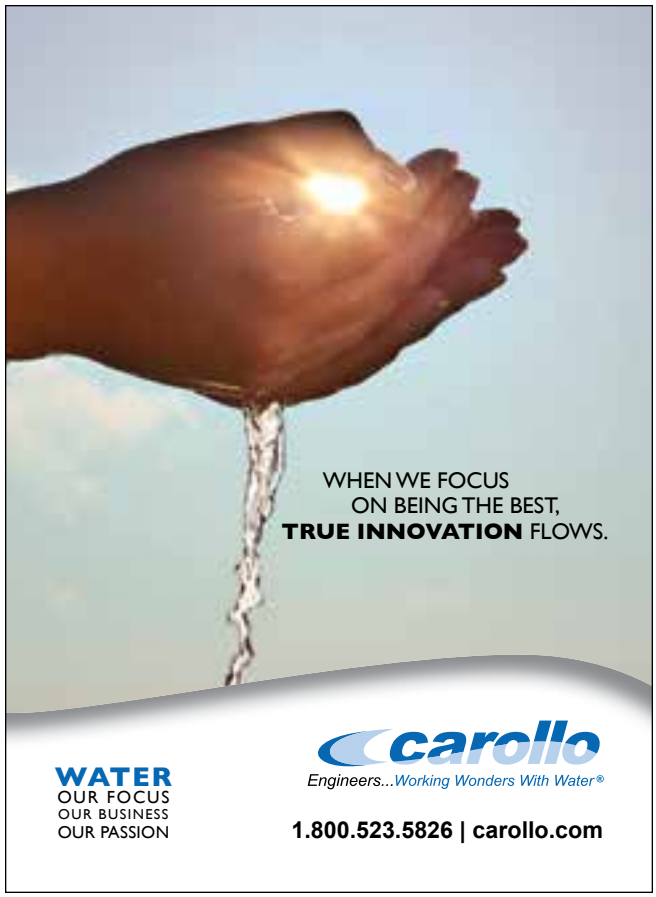
Operator Scholarship recipients Sarah Leavitt and Scott Brown

Student Presentation Award Brenden Mackey (U of U)

Wasatch All Stars.

Rochelle Plazier

CONGRATULATIONS TO ALL WINNERS AND RECIPIENTS, AND THANKS TO ALL ORGANIZERS AND VOLUNTEERS.



Katherine Saltzman

Thriving Despite Low Numbers

Women are underrepresented in water sector, data says

The water sector employs significantly fewer women than the national average of all workers, according to the report, *Renewing the Water Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity*, published in June 2018 by The Brookings Institute (Washington, D.C.).

According to the report, 46.8% of workers across the US are women, though women "only account for 14.9% of the water workforce." Furthermore, the occupational breakdown of women in water is skewed. The report states, "While women make up a majority of water workers in certain administrative positions – including 95% of secretaries – they only account for a fraction of employment in some of the largest water occupations overall, including plumbers (1.4%) and water treatment operators (5.2%)."

Successful women on the job

Joanna Healy, a Grade 4 Certification Operator at the McDowell Creek Wastewater Treatment Plant, which is operated by Charlotte Water in North Carolina, began her career in the mailroom at the Hoover Dam in Nevada. Soon a position testing water and wastewater samples opened, and she took it. Later she moved into compliance reporting. Healy then transferred to a community college where she received an associate degree in Applied Science in Wastewater Treatment before moving to North Carolina.

"Usually there aren't a whole lot of us in the classes," Healy said. "In the maintenance tech class there were over 60 students and I was one of two females."

Healy attained her Grade 4 certification in 2.5 years by earning her associate degree. She also received a Pretreatment and Maintenance Tech 1 certification and plans to get a Pretreatment and Maintenance Tech 2 certification.

Despite few women in her classes, Healy said that she has received support and mentorship from trainers and colleagues throughout her training and career in the water sector.

"I think it's really neat that women and can do anything men can do," Healy said. "That's what I tell my daughter. You can do all the things the guys can do, but you don't have to prove yourself to anyone."

Tara Romine started working at Charlotte Water in October 1990 as a laborer. An operator position later became available and she received on-the-job training to become qualified; more formal training was not readily available then, Romine said. By July 1998 she had received her Grade 4 certification and in 2000 took on the responsibility of first chief operator at Mallard Creek Water Reclamation Facility for Charlotte Water. When the facility became the first ISO certified plant in Charlotte Water, she assisted with the development and creation of the ISO program. In her role, Romine helps implement standard operating procedures and creates work instructions and procedures for new operators in addition to many other responsibilities.

Romine said her career in water has been filled with strong relationships and rewarding opportunities.

"I was always treated well," Romine said. "The gentlemen that I train have given me the utmost respect. It has been a very good working environment for me. I feel like I have really been given a gift to serve the community."

Barriers to entry

The Brookings report includes overall recommendations on improving gender and racial diversity in the water sector. These include increasing the visibility of the sector for younger students, creating more opportunities for workforce training, and expanding career paths for professionals in the water workforce.

However, the report stops short of forming conclusions on why so few women are in the water workforce.

Kalpna Solanki, CEO of the Environmental Operators Certification Program, suggests that Canada faces similar obstacles to the US in terms of recruitment, training, and retention, especially for female employees. Solanki's non-profit organization classifies water and wastewater facilities in British Columbia and Yukon and certifies the operators who work in those provinces.

"Very often people literally fall into the career. It wasn't necessarily a planned path. It would be better if it was proactive rather than reactive," Solanki said.

Often information on these water jobs are heard about at the Canadian equivalent of city or state departments of parks and recreation or departments of sanitation with majority male staff, she responded, "[Men] get into the [water/wastewater] workforce because they happen to be there," she said. "There are not many women [here], so the result is fewer women going into the field from that point."

Solanki echoed the Brooking Report's message that women's job descriptions within water sector are skewed. While things are changing and most female operators love their jobs, she said that she is aware of some situations of discrimination and harassment in the workforce.

"If 10% of the water workforce is female, their number is not spread evenly among the four major area specialties: water treatment, water distribution, wastewater collection and wastewater treatment," she said.

"I would be surprised if more than 1% is female in wastewater collection and 1% to 2% of women in water distribution," Solanki said. "Within that 10% of female operators, there are some specialties that have almost no women at all."

Overcoming entrenched attitudes

Even though Canada has workforce standards in place at public utilities, each employer at the utility must reinforce rules and guide employees on proper workplace behaviors. This is especially true if women have historically been underrepresented in the specialty area.

"Some of the feedback I have received from women especially in water distribution and wastewater collection, [is that] the problem often lies at the employer level," Solanki explained,

"The support mechanisms are not in place in where women are just parachuted into the workforce. The men are not prepared for this change [and] are not educated with regards to workplace harassment. The women are not properly trained in terms of what is acceptable and what is not acceptable behavior and what resources are available to them."

In June 2018, Solanki participated on a panel discussion during a workplace diversity workshop at the Canadian Water Summit. Topics included how to promote the field in general as well as to women; it also dealt with how to better recruit and integrate women in areas of the water sector where they are currently underrepresented.

"Most of the women that I meet like the work, are good at it, and like the variability of the job – there are no two days that are the same." Solanki said, "We do hear of a few women who face harassment but, in general, most the women are happy and really enjoy being in the field."

Amanda Schuffels serves as an example of a happy newcomer to the water sector. In January 2018, she took on the role of full-time Grade 1 wastewater operator at the Kelowna Wastewater Treatment Facility in British Columbia, Canada. Previously she had worked in co-op training positions and part-time roles at the utility.

"A lot of men and women have taken me under their wing and have taught me what I needed to learn so that I can strive in my position, she said. "I love the job and industry."

Despite their lower numbers, female operators and utility leaders are at the forefront of the sector. These women prepare and train new employees, support innovations and technologies, manage the day-to-day operations of their facilities and support the environment and public health for communities across the world.

Katherine Saltzman is a publications assistant at the Water Environment Federation (Alexandria, Va.) where she works on WEF's Operator Initiative programs. DN

ReNEW Water Project Measures

Water, Nutrients, Energy Recovered by US Utilities

NEW ORLEANS – The first-ever analysis of resource recovery by US water utilities shows significant progress in using biosolids and generating energy, but large growth opportunities in water reuse and nutrient capture.

Led by the Water Environment Federation, the ReNEW Water Project utilizes data from national and state databases, publications, and a utility survey, which represents about 25% of municipal wastewater flow and about 20% of biosolids produced in the US.

"With each passing year, more water utilities are engaging in resource recovery, both for the environmental benefits and the economic opportunities that emerge," said Eileen O'Neill, Executive Director of WEF. "Establishing metrics on resource recovery is crucial to moving into a more circular economy that ensures sustainability for future generations. WEF is proud to launch the ReNEW Water Project to monitor and accelerate the rate of water reuse, nutrient capture, and energy generation by facilities."

The data showed the following levels of recovery of available resources:

- **Water reuse** of 2.2 billion gallons per year for a 7% recovery rate. This water primarily is for non-potable uses such as irrigation and groundwater replenishment.
- **Biosolids** of 3.4 million dry metric tons per year for a 51% recovery rate. Recovered biosolids are land applied for fertilizer, composted, and used for other beneficial purposes.
- **Phosphorus** of 68,220 dry metric tons per year for a 21% recovery rate. Phosphorus is used in land-applied biosolids, captured in fertilizer, and recycled water for irrigation.
- **Nitrogen** of 172,400 dry metric tons per year for an 11% recovery rate. This nitrogen is mostly used in land-applied biosolids and recycled water for irrigation.
- **Energy** of 350 megawatts of biogas per year for a 41% recovery rate. Facilities produce biogas, recover heat from the treatment process, and generate electricity.

WEF launched the ReNEW Water Project to create a bold, aspirational, and public call to action to accelerate resource recovery. The NEW stands for nutrients, energy, and water. The first step was establishing the baseline for current resource recovery practices. Later this fall, WEF will announce goals for water utilities to increase resource recovery from baseline levels. New data will be collected on a biannual basis and expanded to Canadian water facilities.

Aging infrastructure, population pressures, climate change, and funding limitations strain water resources and call for sustainable management solutions. Wastewater treatment plants cannot operate merely as disposal facilities any longer. Instead, resource recovery must become a cornerstone of facility operation, producing water for reuse, recovering nutrients, and reducing fossil fuel consumption by using the energy in wastewater. To help guide utilities and sector decisionmakers, WEF offers Resource Recovery Roadmaps.

Supporting organizations for the ReNEW Water Project include the Association of Clean Water Administrators (ACWA), National Association of Clean Water Agencies (NACWA), The Water Research Foundation (WRF), and WateReuse Association, as well as Réseau Environnement in Quebec. For more information, visit *www.wef.org/ReNEW*. DN

When BREW AND POO Mix

CRAFT BREWERY IMPACT ON WASTEWATER TREATMENT

By Chris Pasch and Ashley Lewis

INTRODUCTION

Over the last five years municipalities across Texas have seen craft breweries setting up shop. These new businesses are generally welcomed by the community, but the wastewater generated by these breweries can pose potential problems, particularly for smaller municipalities with limited treatment capacity at their Water Resources Recovery Facility (WRRF) [The term water resource recovery facility is used because the Water Environment Federation (WEF; Alexandria, Va.) uses the term in place of wastewater treatment plant and other conventional names. The name change reflects a changing paradigm in the water sector, focusing on resource recovery.] Potential problems include difficulty treating the high strength wastewater, regulating the new discharge within existing ordinances, and establishing permit limits through the municipality's pretreatment program. Furthermore, brewers may be surprised to learn that their wastewater can be detrimental to WRRF processes and that their discharge may not comply with local pretreatment ordinances.

CITIES WELCOME THE NEW BUSINESS

The significant growth in the craft brew business can be directly linked to a change in State law regulating small breweries. In 2013 the Texas Legislature passed a law allowing breweries to sell beer onsite and brewpubs to sell beer outside of their own facilities (i.e., in retail stores). This deregulation created opportunities and resulted in many new breweries being founded. According to the website

> "IN AUGUST 2018, TEXAS HAD 244 BREWPUBS, BREWPUBS COMBINED WITH A BREWERY, AND MICROBREWERIES IN OPERATION. TWO THIRDS OF THESE BREWERIES WENT INTO OPERATION AFTER 2013."

Surely these problems are preventable. A proactive approach to management of brewery wastewater should be a top priority for Texas utilities. This article provides a summary of the brewery business and a discussion of how utilities can prepare for handling and regulating brewery wastewater.

www.ratebeer.com, in August 2018, Texas had 244 brewpubs, brewpubs combined with a brewery, and microbreweries in operation. Two thirds of these breweries went into operation after 2013. Prior to 2013, there were 68 craft breweries in Texas Figure 1 presents the annual increase in the number of craft breweries since.

It is reasonable to assume that the craft brew business will continue to grow in Texas as new breweries launch and existing breweries expand their operations. Most cities would welcome a new brewery to town, and cities that do not yet have a local craft brewery may even consider copying the efforts of the City of Madras in Oregon. The City thirsts for a brewery to come to town and is promoting itself to potential brewers on the website *www.brewitmadras.com*.

Real Ale Brewing Company is an example of a brewery's significant impact on a small Texas town. Real Ale Brewing company picked the City of Blanco 24 years ago for the reliable water supply with the right water chemistry for its Real Ale beers such as Firemans #4. Real Ale owners, Gabriel Gregerman and husband Brad Farbstein, founded a small basement operation in 1996. The operation has grown significantly since and is now one of the largest breweries in Texas, employing over 50 people.

Real Ale partnered with the City of Blanco as the brewery expanded and wastewater discharges increased. When treatment capacity at the City's WRRF was no longer able to handle the projected treatment needs, Real Ale invested over a million dollars in a pretreatment system. Business grew rapidly while the pretreatment facility was being designed and built. In the interim period, Real Ale had to divert high-strength wastewater to a haul-off tank, thereby reducing the biochemical oxygen demand (BOD) load to levels that the WRRF could treat.

In the Real Ale pretreatment system, the 100 to 110 degrees Fahrenheit waste stream is filtered and the solids are dewatered. The liquid waste is pumped to a settling tank and then to a pH balancing unit. The waste stream is seeded with commercially sourced bacteria to facilitate aerobic digestion in a lagoon system with a 21-day retention time. The pretreatment system also includes pH balancing equipment designed to treat spikes of 160-degree Fahrenheit caustic cleaning solution. The system routinely reduces the BOD to less than 200 milligrams per liter (mg/L) before discharging to the collection system. The City levies a surcharge on Real Ale when its discharge exceeds 200 mg/L BOD.

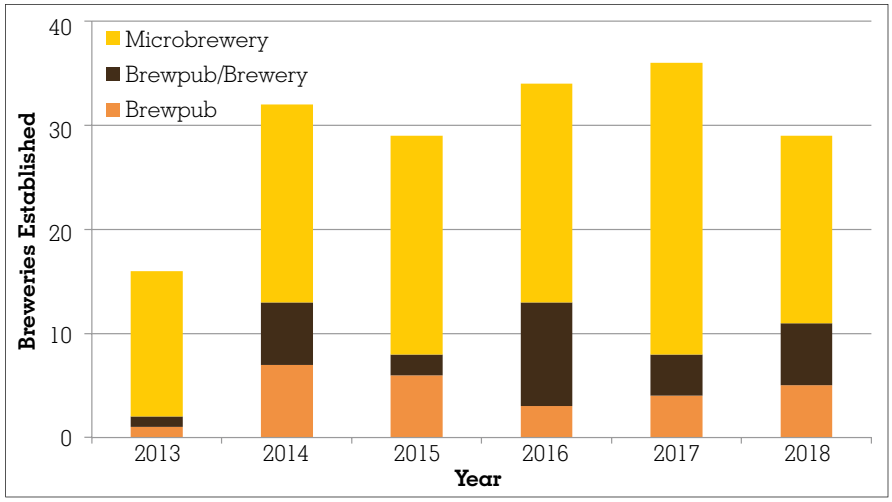


Figure 1: Number of Craft Breweries Established in Texas by Year

BREWERY WASTEWATER GENERATION

The Reinheitsgebot, also called the 'German Beer Purity Law', is a regulation limiting the ingredients in beer in Germany. In its early version, the Gebot stipulated that beer was only to be brewed using water, malt and hops. Yeast was not known to exist in the 16th century and was added at a later date. These main ingredients are still used in making beer, however, many modern-day breweries add other ingredients. Since the primary ingredients are organic and most of the ingredients do not end up in the beer, breweries discharge high-strength wastewater. Other chemicals and products used for brewing, cleaning, maintenance, and labeling are also discharged to the collection system, the combination can make for a complex waste stream that can be of concern to the utility.

Typical Wastewater Composition

Most often BOD and pH from the brewery waste discharge are the primary concern to the utility. Temperature can also be a concern because hot water can be dangerous to maintenance personnel working in the collection system. Additionally, the brew process requires a lot of water. Only a tenth to a quarter of water used may be used for the good stuff and the rest is discharged. The primary constituents of brewery wastewater include the following:

Wort: Liquid extracted from the mashing process.
Beer: When the good stuff goes bad and needs to be wasted.
Trub: Solids composed mainly of heavy fats, coagulated proteins, and inactive yeast.
Propylene glycol: Used to control temperature during fermentation cooling of beer. Could be in discharge due to leak.
Label glue: Used in bottling operation, the clean-up wastewater can be high in BOD.
Defoamer: Used to control foam during the fermentation process.
Cleaner: Caustic, Phosphoric Acid, Nitric Acid, Peracetic Acid, Quaternary Ammonium Compounds
Detergents: Soap

Hydrogen sulfide may also be detected in brewery wastewater. Hydrogen sulfide will form when brewery wastewater undergoes anaerobic digestion, the digestion is typically not intentional. Hydrogen sulfide

is primarily a problem to the breweries because of its corrosivity, however, corrosion can lead to unexpected discharges from the brewery when equipment fails and pipes disintegrate. Hydrogen sulfide can also cause corrosion and odor problems inside the collection system.

Discharge of Acid

Passivation is the treatment of stainless steel with acid to form a protective surface oxide layer and can prevent contamination of the beer by iron, which can ruin the taste. Passivation is required for new equipment, but some breweries use periodic passivation as a cleaning procedure to remove rust spots, free-iron deposits, beerstone, hard water scale, and other mineral deposits.

COMMUNICATION AS PREVENTION

Clearly communicating utilities' position and local discharge restrictions can be beneficial in preventing unnecessary problems. Brewers may not understand the potential negative impact of their waste on wastewater treatment processes and the expense associated with treating a high-strength waste stream. The utility personnel may have an appreciation of the final brew product but may not appreciate the complexity of the brew process. Establishing good communication lines can serve to identify potential problems and potential solutions before they problems ever occur.

An option to consider is to invite the brewer to the WRRF and explain the treatment processes. Both the brew master and the wastewater treatment operator depend on microorganisms to function well to achieve the desired final product. A brewer will likely understand and appreciate the complexities of the biological wastewater treatment processes more so than many dischargers and will grasp the need to protect the processes, and the difficulty to recover from a disrupted process. Furthermore, it will be advantageous for utility personnel to visit the brewery to gain an understanding of the operation and assess the potential impact on the WRRF.

Communication can be used to educate the brewer on:

- Need to meet requirements in local ordinance for discharges of non-domestic wastewater.
- Need for surcharges to treat high-strength wastes.
- Need to prepare a plan to prevent slug loads from entering the collection system because a slug load can disrupt the treatment process.
- Need to control pH to limit corrosion and other undesirable chemical reactions in the collection system.
- Need to control temperature and pH to protect utility maintenance personnel and the collection system.
- Need to control discharge flow, especially when the municipality's collection system is already near capacity.
- Need to protect the WRRF processes. A disrupted WRRF can harm the environment and can be costly to both utility and the brewery.

> "THE UTILITY OPERATING A SMALLER TREATMENT PLANT WILL NEED TO UNDERSTAND THE BUSINESS CYCLE OF THE BREWERY AND THE MAGNITUDE OF HIGH-STRENGTH WASTE LOADS AND DETERMINE WHETHER THESE LOADS CAN BE TREATED ADEQUATELY."

BREWERY IMPACT ON THE UTILITY OPERATION

Breweries operate in a batch mode, resulting in fluctuating wastewater flows from the brewery into the collection system and to the WRRF. The utility operating a smaller treatment plant will need to understand the business cycle of the brewery and the magnitude of high-strength waste loads and determine whether these loads can be treated adequately. Large metropolitan WRRFs have the capacity to treat the high-strength waste from a typical craft brew operation. Independent of size, WRRFs may have issues with other wastes from the breweries.

Corrosion due to the brewery wastewater containing corrosive chemicals used by the brewery or due to the formation of hydrogen sulfide would most likely occur in the collection system. Periodic inspection of the sewer line, manholes, and lift stations downstream of a brewery discharge may be necessary to identify maintenance issues.

REGULATING BREWERIES' DISCHARGES TO THE COLLECTION SYSTEM

City ordinances regulate the discharge of non-domestic wastewater to the collection system. The ordinance will restrict the discharge of high and low pH wastewater. The ordinance may have narrative restrictions that apply to breweries. An example of a narrative restriction applicable to breweries is the prohibition of a discharge to the collection system that causes interference of the wastewater treatment processes. The ordinance may also include BOD and TSS limits. Brewers have been surprised to learn, some after starting their operation, that the municipality has uniform concentration limits for BOD and TSS of 200 or 250 mg/L, each, and have no provisions for surcharges

Over 70 utilities in Texas have an approved industrial pretreatment program. The Texas Commission on Environmental Quality (TCEQ) may require development of a pretreatment program when the utility meets the following conditions:

- Design flow greater than five million gallons per day
- Industry discharges pollutants to collection system that can either pass through the treatment plant or interfere with wastewater treatment process
- At least one industrial user discharging to collection system meets the US Environmental Protection Agency (EPA) definition of categorical industrial users (CIUs). [Breweries are not CIUs.]

Utilities with a TCEQ approved industrial pretreatment programs regulate breweries through the authority of the pretreatment program. Pretreatment programs in Texas use different approaches to regulate breweries, ranging from issuing permits with discharge limits to only monitoring the brewery discharge for the assessment of surcharges.

The same approaches used by approved programs can be used by all utilities. The following summarizes the responses of an informal survey among members of the WEAT Pretreatment Knowledge Committee and other industrial pretreatment coordinators in Texas.

Permits

Some Texas utilities regulate breweries by issuing permits with concentration-based discharge limits. Limits are typically specified for BOD, TSS, and metals. A maximum discharge temperature may be specified and an upper and lower pH as well.

An advantage of regulating through permit is that it is specific to the permittee and spells out very clearly what is expected of the permittee, reducing the chance of a misunderstanding. Furthermore, it could provide advantageous when a utility enforces on a brewery for noncompliance. The informal survey did not identify any utility where a brewery was in persistent noncompliance. However, a large brewery in Pennsylvania proved an unfortunate example to the brewing industry when continued noncompliance with the utilities pretreatment permit resulted in an EPA enforcement case against the brewery and a multimillion dollar fine.

Passivation Notification

For the protection of sanitation workers and the collection system, at least one Texas utility requires breweries to notify the pretreatment program coordinator at least 72-hours prior to passivating the stainless-steel brew tanks. Passivation, which is not unique to breweries, requires strong acids. Nitric acid, phosphoric acid, and citric acid are typical ingredients in the passivation process. Passivation must be followed by a neutralization step prior to discharge to discharge to the collection system.

[Passivation is also used in the metal plating industry and the term is used in the definition for metal finishing CIUs. This has led some pretreatment program coordinators wondering whether breweries that employ passivation need to be classified as CIU. However, at this time there has been no additional guidance from the EPA to say that breweries would fall under the Metal Finishing regulations and would therefore be a CIU.]

Maximum and Minimum pH Limits

City ordinances include pH limitations. At least one utility specifically requires that breweries must install pretreatment equipment to achieve an effluent discharge with a pH of no lower than 5.0 and no higher than 10.0.

Best Management Practices

At least one utility outlined best management practices (BMPs) specifically for small breweries. BMPs include solids management, pH control, prevention of high-strength slug loads, temperature control to below 150-degrees Fahrenheit, and prevention of discharge from a spill.

Discharge Monitoring

Several utilities monitor the brewery discharge and assess surcharges for high-strength wastewater. At least one utility assesses the monitoring data to determine whether a brewery should be permitted.

CHEERS

The craft brew industry has seen significant growth in Texas and growth is likely to continue. Municipalities have welcomed these new businesses and breweries have generally been very good neighbors. Benjamin Franklin is quoted as saying "an ounce of prevention is worth a pound of cure." Realizing that this quotation may be misunderstood within the context of this article, it nevertheless holds true as it pertains to preparing for and working with existing or new craft breweries coming to town.

ACKNOWLEDGEMENTS

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Candy Grams

By Marianka Sochanska

The YPs got together to prepare holiday candygrams to sell at the WEAU Mid-year Conference as a Water For People fundraiser. Using their typically hidden talents of bow-tying and self-discipline around chocolate, the YPs prepared 84 candygrams and raised over $250, which multiplies to an impact value of $2,620 (via WFP Impact Calculator). When asked about the candygram idea, Rebecca Yoo says "We wanted to create something people would use, and not just random décor that would end up in the trash. We hope those who purchased candygrams can get a head-start on stocking-stuffers and reuse the mason jars." Thank you to all who contributed and please contact *ryoo@brwncald.com* if you're interested in donating or purchasing candygrams. DN

Young Professionals Mid-Year Conference Social

The WEAU Young Professionals (YPs) held their annual evening social in conjunction with WEAU's Midyear Conference. The purpose of the social was to provide an opportunity for those YPs attending the conference to network and discuss the conference highlights. This year's dinner was held at Red Robin Gourmet Burgers in West Valley City. The social was a great success, with 17 people attending. The group included several engineers, recent hires, students, vendor representatives, and WEAU leadership including Chris Reilley, Rob Jaterka, Brandon Wyatt, and Jeff Beckman. The fun and friendly atmosphere helped attendees form new relationships and strengthen existing ties.

A big thank you to the Young Professionals Committee for organizing this wonderful event and to all those who attended. We look forward to seeing everyone again at the Jazz Game! DN

Utah Jazz Winter Social!

Come join us for socializing, NBA Basketball, and food!
Friday, January 18th against the Cleveland Cavaliers
Discounted rate of $20/person includes the game and dinner.
Please visit *www.weau.org* to sign up and pay for your ticket.
(Tickets will be for sale December 1 through January 11 and they are limited, so get yours quickly!) DN

Mark Your Calendars

Call for Abstracts

The Annual Conference Committee is accepting abstracts for presentation at the 2019 WEAU Annual Conference. All topics related to water quality, collection, treatment, compliance, utility management, or other related topics will be considered. Abstracts will be reviewed and you will be notified if your presentation is accepted. The presentations will be made to attendees at the conference and formal paper submissions are not required.

Submit abstracts online at www.weau.org. Deadline December 14, 2018

Pretreatment to Retirement

The Pretreatment Group is amazing. The instant someone new joins, hands reach out, phone numbers are exchanged, and doors open to offer help. In April 2019, one of the greats is leaving the group and will be retiring. Jeff Macfarlane from North Davis Sewer District has been one of the first people to greet and help anyone in Pretreatment. He is always the one person you can count on to give a helping hand.

Jeff has also been a valuable member of the Pretreatment Committee by helping plan trainings, serving as the Chair, and giving presentations. Without Jeff, the Pretreatment Committee meetings and trainings would not be as successful as they have been over the years.

At the Region 8 Pretreatment Association (R8PA) Conferences, you could always count on Jeff to give a great presentation and to be a friendly, smiling face to hang out with for dinner and great conversation.

Thank you Jeff for your help and support over the year!

The Pretreatment Group DN

Jeff, it has been a pleasure knowing you, I hope you live a long and prosperous life and make the URS sweat about your long retirement.

-Lonn Rasmussen

He is a guy with a LOTS of knowledge. But never came across as if He is 'Mr. I Know Everything'. He is always just a phone call away to lend you a hand. Best of luck, Jeff.

-Fernando Alanis

Jeff is truly a great man and his willingness to assist those in need is so wonderful. He has assisted in mentoring those in pretreatment with assistance, his willingness to present at conferences and trainings, his knowledge, and his commitment to spend time explaining pretreatment to those in need is so appreciated. I wish Jeff a happy retirement. Now go and enjoy what you have earned.

-Jen Robinson

Words cannot express the appreciation I have to Jeff. He is a true friend and peer. He has been so much help to me over the years, Thank you Jeff – you deserve a wonderful retirement.

-Sarah Leavitt

Jeff is truly a kind person you can consider as a friend and a mentor. I will miss working with you.

-Lyndon Tan

Jeff was such a help to me as a new Pretreatment coordinator. He was friendly and willing to answer questions – very approachable. He even volunteered to come up to Brigham City to help me. He spent a whole afternoon up here getting familiar with our program and then answering my questions and giving advice. That was golden for me – I was so grateful to have a mentor. I will miss him but I am happy for him.

-Jennifer Mickelsen

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