SPRING
2015

The Official Publication of the Water Environment Association of Utah

DIGESTED news

Celebrating 50 Years of Clean Water

WEAU ANNUAL CONFERENCE

Dixie Center, St. George, Utah

April 28 - May 1, 2015

Snyderville Basin Water Reclamation District
2800 Homestead Road
Park City, Utah 84098
Address service requested

INSIDE:

aeration simplified.

STREAMLINE®

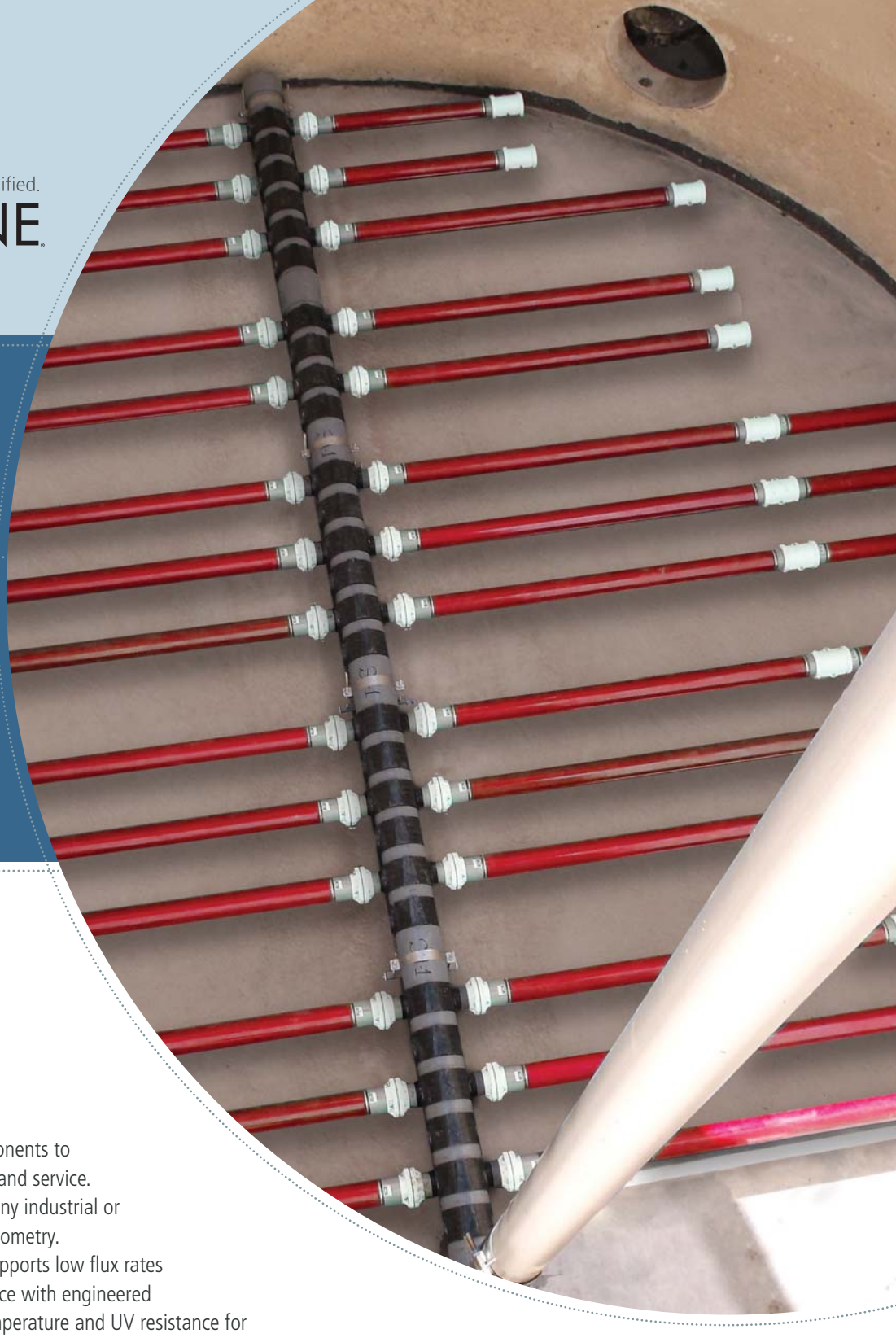
high performance panel diffuser

lower operating costs

lower cost of ownership

lower maintenance costs

increased productivity



aeration simplified.

The EDI STREAMLINE® panel utilizes innovative integral diffusers, tubular membranes and inline support components to deliver the highest level of simplicity and service. STREAMLINE® can be configured to any industrial or municipal application, tank size or geometry. STREAMLINE®'s efficient geometry supports low flux rates resulting in ultra high OTE performance with engineered materials for maximum chemical, temperature and UV resistance for reduced fouling and optimum performance. With 1,000s of installations worldwide, the STREAMLINE® panel has a long history of success.

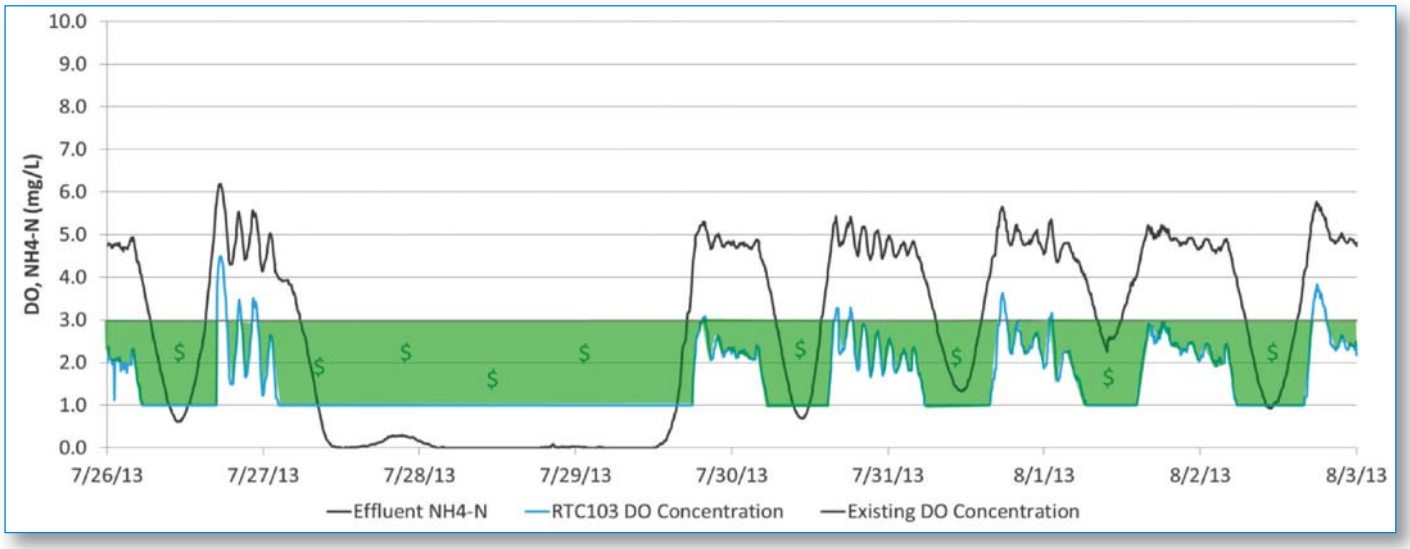
Why is a round panel better than flat panel? Visit www.streamlinediffuser.com to see a side by side comparison.

EDI®

aeration for life®

Environmental Dynamics International | (+1) 573.474.9456 | www.environmentaldynamics.com · www.wastewater.com

YOUR PROCESS. UNDER CONTROL.



A conventional activated sludge plant using Hach's RTC-N to control nitrification. Area in green indicates total savings.

Why overtreat? Simply set your process control limits and let RTC do the rest.

Situation:
Over treating gets the job done and keeps your facility compliant, but it wastes money. Whether you're removing phosphorus, controlling nitrification or treating sludge, there is a more sustainable way to manage your processes.

Action:
Using tools you already know, Hach's Real-Time Control (RTC) Systems monitor and optimize your process minute by minute, treating only what you need.

Results:
By treating only what you need your facility operates efficiently, meeting permit limits and reducing operating costs.

To learn your savings potential with RTC, visit: hachco.ca/rtc

Phosphorus Removal | Nitrification Control | Sludge Treatment

HACH®
Be Right™

Contents

Published by:
Craig Kelman & Associates
On behalf of the WEAU
Tel: 866-985-9780
Fax: 866-985-9799
www.kelmanonline.com

Managing Editor, **Scott Kelman**
Design/Layout, **Daniel Goulet**
Advertising Sales, **Kris Fillion**
Advertising Co-ordinator, **Stefanie Hagidiakow**

FSC www.fsc.org
MIX
Paper from responsible sources
FSC® C103094

FEATURES

Departments

DIGESTED news

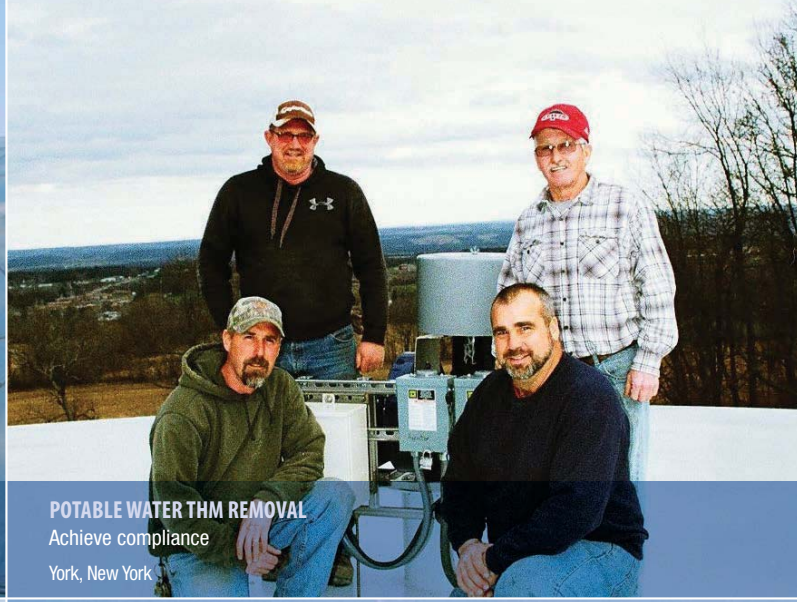
Available Online

With print and electronic communication operating hand-in-hand, you can take advantage of the fact that *Digested News* magazine is available online in a highly interactive format.

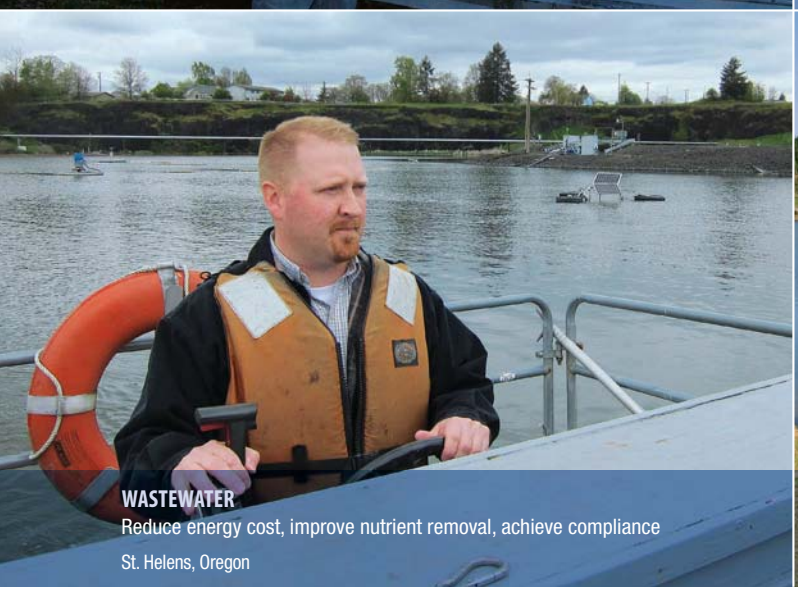
A user-friendly, interactive Media Rich PDF format that includes:

1. Active hyper-links to all websites and e-mails contained in the publication
2. Active links to the specific stories from the front cover and contents page
3. Active links to advertiser websites from their ads

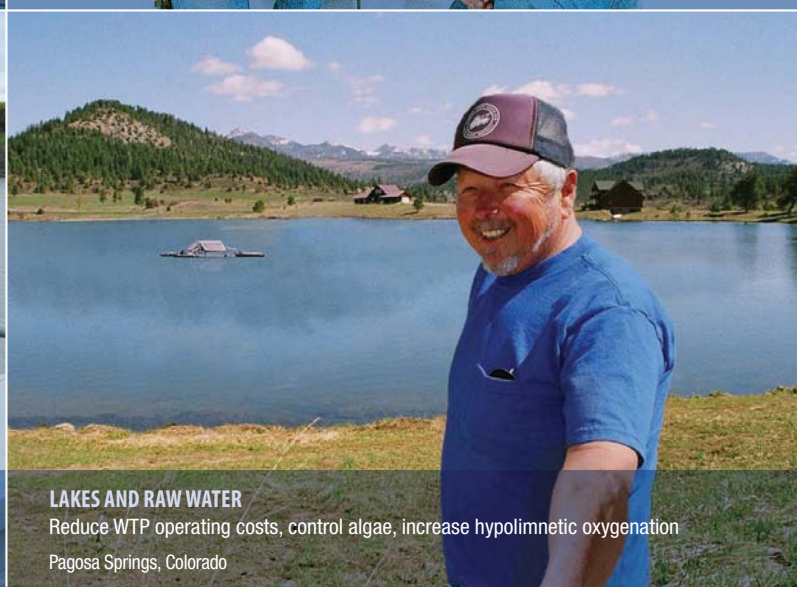
POTABLE WATER MIXING
Reduce stratification, improve residual, prevent ice buildup
Concord, Massachusetts



POTABLE WATER THM REMOVAL
Achieve compliance
York, New York



WASTEWATER
Reduce energy cost, improve nutrient removal, achieve compliance
St. Helens, Oregon



LAKES AND RAW WATER
Reduce WTP operating costs, control algae, increase hypolimnetic oxygenation
Pagosa Springs, Colorado

Water professionals agree.

Medora Corporation helps solve water quality problems and save money.

From California to New York, water operators and engineers trust Medora Corporation to help reduce operating costs and achieve better compliance in their potable water systems, wastewater lagoons and lakes. They depend on our electric, solar and air-powered systems for fast, reliable results. And that's just the beginning. Year after year, our customer support and long-term product performance ensure complete satisfaction.

To read the case studies and learn more, visit
medoraco.com/betterwater

Medora Corporation • Dickinson, ND • 866-437-8076 • www.medoraco.com

GridBee® SolarBee®
Brands of Medora Corporation

Another amazing year has gone by

Mike Foerster

Another year has gone by and it is hard to believe that it is again time for our annual conference. It will be held April 28 - May 1 at the Dixie Center in St. George. What a wonderful opportunity it always is for us to get together to share ideas, learn, grow and have fun together. The Annual Conference Committee has lined up a fascinating program, the operators challenge will be as exciting as ever and the exhibit hall will be a show that is sure to please. I hope that each of you will take the opportunity to join us for great interactions, earning CEU's, learning and lots of fun.

We just had a fun night at the Jazz game thanks to our YP committee. The food was delicious, the conversations great and most importantly the Jazz won. Thanks to all those who helped make it a success. Hopefully we'll be able to do it again.

This last year has been full of training, challenges and fun. Thank you to all of those who helped make it great. I never cease to be amazed at how many people it takes to run an organization like ours and how many people are willing to help. A special thanks to the employers who allow their employees time off to volunteer. We all recognize and appreciate the sacrifice you make to let your staff members serve.

As we continue to grow and move forward please continue to look for ways to help and jump in with both feet. We are a 100% volunteer organization always in need of good help. I promise you that if you do, it will be a rewarding experience, you'll make new friends and be glad you did. DN

> "I never cease to be amazed at how many people it takes to run an organization like ours and how many people are willing to help.

Utah On-Site Wastewater Association puts on great show

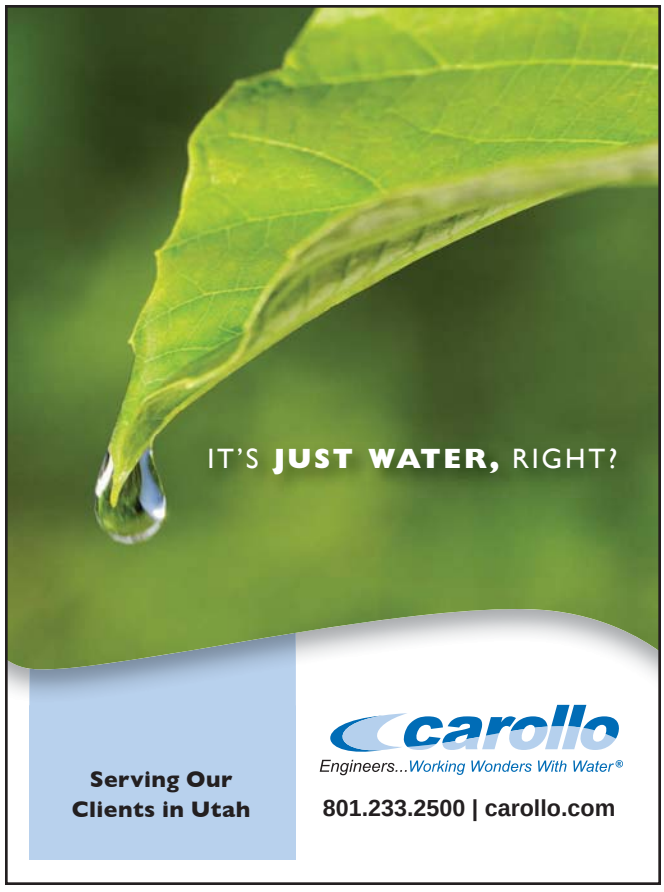
Chad Burrell

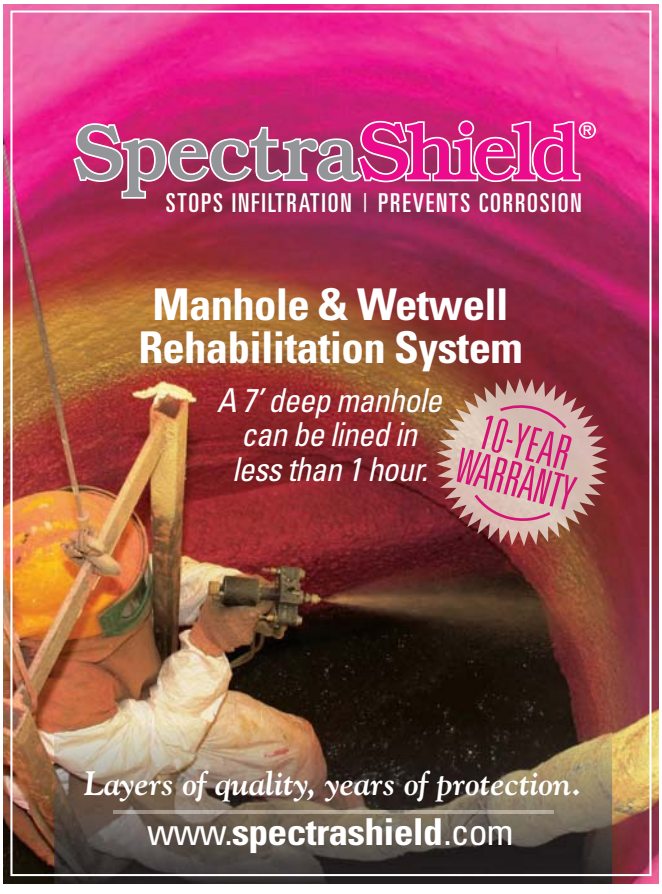
In January, I had the opportunity of attending a conference sponsored by the Utah On-Site Wastewater Association. This is an organization that focuses on, and supports the installation, regulation, and improvement of septic systems.

Keynote speaker for the conference was A. Robert Rubin from North Carolina State University who was both knowledgeable and entertaining. We also heard from Eric Casey who represented the National On-Site Wastewater Recycling Association. This was very interesting for me to attend because even though I have been employed by water reclamation facilities for the last 16 years I have grown up and lived over 23 years of my life in homes and communities where my family has dealt with septic systems. I have to say that during all that time we had very good success with our systems, much of that can be attributed to maintaining them properly. I hope my use and support of septic systems over the years is not looked at as me not 'contributing' fully to the industry I work in, literally and figuratively!!

On a serious note I am thankful for the knowledge I came away from this conference with. I am impressed with the focus that was made on water reuse of secondary water from on-site systems. I was also very interested to learn of the biological and nutrient removal abilities that some of these new on-site technologies have to offer.

I will continue to believe that our treatment facilities do much to protect human health and the environment. But let's remember that properly installed and maintained on-site systems have a place was well. DN





Mark Your Calendars!

WATER ENVIRONMENT ASSOCIATION OF UTAH

WEAU ANNUAL CONFERENCE

Dixie Center, St. George, Utah

Pre-Conference
April 28, 2015

Conference & Exposition
April 29 - May 1, 2015

Technical Program Schedule
April 29, 2015

Wed.	Sunbrook A	Sunbrook B	Sunbrook C	Entrada A	Entrada B	Entrada C	Exhibit Hall
	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	
8:00 - 9:00	Water Quality Board Meeting - Garden Room						Operator Challenge Ongoing, Exhibits Open
9:00 - 10:00	-	-	-	Trustee, Board Member and Council-person Walking Tour of Exhibit Hall	-	-	Operator Challenge Ongoing, Exhibits Open
10:00 - 11:00	-	-	-	Trustee, Board Member and Council-person Walking Tour of Exhibit Hall	-	-	Operator Challenge Ongoing, Exhibits Open
Session A	Sunbrook A	Sunbrook B	Sunbrook C	Entrada A	Entrada B	Entrada C	Exhibit Hall
	Utility Management		WWTP Design	Collections	Nutrients	Disinfection	
Wed.	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	
1:30 - 2:05	Discussion on State Procurement Code for Professional Services		The Hidden Cost of P 1.0 - Salt Lake City $56M Case Study	Soils Testing and Compaction	Managing Carbon in Your Facility to Prepare for More Stringent Nutrient Limits	Non-Contact UV Disinfection; an Introduction and Comparison to Conventional Quartz Based Contact UV Systems	Exhibits Open
			Tom Ward	AGEC	Tanja Rauch-Williams	Taylor Reynolds	
2:10 - 2:45			Wastewater sludge conditioning to improve system performance	HDPE Weld Inspection	Review of Critical Operation Parameters in Biological Phosphorus Removal	Goodbye - Chlorine Gas	Exhibits Open
	Mark Anderson, ACEC		John Grucella	Victor Godfrey	Chris Machado	Matthew Myers	
2:45 - 3:30	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall
	Utility Management		WWTP Design	Collections	Nutrients	Disinfection	
3:30 - 4:05	Discussion on State Procurement Code for Professional Services		Finding the Right Fit: Screen Selection, Design, and Startup	Public Involvement During Sewer Construction	Overview of New and Emerging Technologies for Nitrogen and Nutrient Reduction	Advances with Ultraviolet Disinfection	Exhibits Open
			Gary Vance	Siobhan Locke	John Fraser	Patrick Bollman	
4:10 - 4:45			High Solids Fluid Mixing in Aerobic & Anoxic Environments	Confined Space Entry & Trench Safety	Long-Term Economic And Plantwide Efficiency Opportunities Available with the Implementation of Nutrient Removal	Introduction of VigorOx® WWT II Peracetic Acid for Wastewater Disinfection	Exhibits Open
	Roundtable		Jeffrey T. Kelly	Doug Folsom	William Leaf	Philip Block	

Technical Program Schedule

April 30, 2015

Session B	Sunbrook A	Sunbrook B	Sunbrook C	Entrada A	Entrada B	Entrada C	Exhibit Hall
	Finance	Laboratory	Innovative Equipment	Collections	Nutrients	Operations	
Thurs.	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	
7:00 - 8:30							POTW Manager's Meeting
8:30 - 9:05	Innovative Sewer Rate Structuring	What Operators Need to Know About Whole Effluent Toxicity Testing	An Innovative Primary Treatment Using Cloth Depth Filtration Technology	West Side Story (Orange Street Sewer Rehabilitation & Master Plan Implementation)	Phosphorus Removal--some of the Utah Lake Issues	Operations	Exhibits Open
	Matt Millis	Lee Rawlings	Jack Ma	Derek Velarde	LaVere B. Merritt	Joe Price	
9:10 - 9:45	Leading Trends in Employment Practices Liability	Nutrient Limits are Here. Now What?	Innovative Filtration System Provides Two Functions for The Price of One - The World's Largest Compressible Media Filter	Fighting the Infiltration	Optimizing the Activated Sludge Process for Nutrient Removal	Operations	Exhibits Open
	Darrell Child	Ted Holt	John Richardson	Steve Hansen	Eric Wahlberg	Joe Price	
9:45 - 10:30	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall
	Finance	Laboratory	Innovative Equipment	Collections	Nutrients	Operations	
10:30 - 11:05	Maximizing Your State Retirement Benefits	A Look Behind the Laboratory Data Curtain: The Basics of Quality Control	Practical experience with full-scale structured sheet media (SSM) integrated fixed-film activated sludge (IFAS) systems for nitrification and denitrification	High Velocity Cleaning	Will EPA's Updated Ammonia Criteria Trump Utah DWQ's Nutrient Planning? What it Might Mean for Facility Planning	2014 Wastewater Plant Disaster Recovery	Exhibits Open
	Mike Wilson	Tony Francis	Hua Li	Tim Madsen	Trevor Lindley	Jeff Richens	
11:10 - 11:45	Benjamin Franklin and the Virtues of Public Works	Sampling, preservation, and chain of custody	Innovative approaches to biological retrofits	Ice Pigging Sewer Force Mains	A Site-Specific Assessment of EPA's New Ammonia Criteria: Freshwater Mollusk Survey	Struvite: What Is It and How Do You Control It?	Exhibits Open
	Wendell Bosen	Robert Aullman	Steve Myers	Ron Rappard	David Richards	Phil Heck	

April 30, 2015

Session C	Sunbrook A	Sunbrook B	Sunbrook C	Entrada A	Entrada B	Entrada C	Exhibit Hall
	Public Outreach	Biosolids	Water Quality	Collections	Nutrients	Operations	
Thurs.	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	
1:30 - 2:05	Personal Imaging	Gas Production from Solid Waste Streams	Groundwater Study of the Francis Sewage Lagoon	Advancements in Pipeline Rehabilitation Technology	Activated Sludge Process Optimization	Treat the Cause, Not the Symptoms	Exhibits Open
	Mike Cottam	Anthony Daw	Lucy Jordan	Erez Allouche	Jim Goodley	Weston Youd	
2:10 - 2:45	Public Imaging Through Communication and Marketing	Improved Air Quality Using Digester Gas Cogeneration Engines	Fate of Elected Estrogen During Biosolids Treatment	So, you want to rehab a sewer manhole	Challenges in applying deammonification reactor in wastewater treatment plants	Using New Technologies to Simplify Daily Rounds	Exhibits Open
	Michael Sulivan	David Hatch	Pei Huang	Steve Meyer	Sha Wu	Matt Stayner	
2:45 - 3:30	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall	Break - Exhibit Hall
	Misc WW Topics	Misc WW Topics	Water Quality	Collections	Nutrients	Operations	
3:30 - 4:05	It's 10 p.m. Do you know where your odors are? Keeping a close eye on hydrogen sulfide.	Configuring Your Microprocessor-Based Relay System for Maximum Value	Assessing and Managing Great Salt Lake's Impounded Wetlands	What Do You Do When Your Pipe Fails? Review of CVWRF's Grainger-Hunter Interceptor Siphon Failure and Rehabilitation	Alternative Pathways of Denitrification: To Achieve Better Total Nitrogen Removal	Low Tech/High Value Headworks Screen Testing	Vendor Breakdown
	Bryan Mansell	Steve Nollette	Theron Miller	Phil Heck	Ananda Shankar Bhattacharjee	Clint Rogers	
4:10 - 4:45	Prerotation - Automatic, self-cleaning wet wells	Is Program Management Right for You?	Understanding Nitrogen Dynamics and Organic Matter Sources in the Jordan River and wetlands associated with Great Salt Lake	Tractive Force-The Superior Approach to Self-cleansing Sewer Design?	Development of Water Quality Standards for Willard Spur, Great Salt Lake, Utah	Centrifugal Pumps Trouble Shooting	Vendor Breakdown
	Eric Tobin	Tom Jacobs	Shaikha Abedin	LaVere B. Merritt	Jeff DenBleyker	Randy Cowden	

May 1, 2015

Session D	Sunbrook A	Sunbrook B	Sunbrook C	Entrada A	Entrada B	Entrada C	Exhibit Hall
Fri.	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	Moderator - TBD	
8:30 - 9:15	What the Hell does he mean OPTIMIZE?		Closed	Trenchless Applications for New Sewer Construction		Closed	Closed
	Paul Krauth			Peter Duberow			
9:15 - 10:00	Regulatory Status/Update on Nutrient Limits in Utah		Closed	1100 West Pump Station Replacement		Closed	Closed
	Walt Baker			Don Telford/Brent Packer			
10:00 - 10:45	Cyanobacteria, Cyanotoxins and the Damn Dead Dogs		Closed	Collection System Jeopardy		Closed	Closed
	Leland Myers			Mike Foerster			

is more than just talk

As we continue to deliver valuable information through the pages of this magazine, in a printed format that is appealing, reader-friendly and not lost in the proliferation of electronic messages that are bombarding our senses, we are also well aware of the need to be respectful of our environment. That is why we are committed to publishing the magazine in the most environmentally-friendly process possible. Here is what we mean:

- We use lighter publication stock that consists of recycled paper. This paper has been certified to meet the environmental and social standards of the Forest Stewardship Council™ (FSC®) and comes from responsibly managed forests, and verified recycled sources making this a RENEWABLE and SUSTAINABLE resource.
- Our computer-to-plate technology reduces the amount of chemistry required to create plates for the printing process. The resulting chemistry is neutralized to the extent that it can be safely discharged to the drain.
- We use vegetable oil-based inks to print the magazine. This means that we are not using resource-depleting petroleum-based ink products and that the subsequent recycling of the paper in this magazine is much more environment friendly.
- During the printing process, we use a solvent recycling system that separates the water from the recovered solvents and leaves only about 5% residue. This results in reduced solvent usage, handling and hazardous hauling.
- We ensure that an efficient recycling program is used for all printing plates and all waste paper.
- Within the pages of each issue, we actively encourage our readers to REUSE and RECYCLE.
- In order to reduce our carbon footprint on the planet, we utilize a carbon offset program in conjunction with any air travel we undertake related to our publishing responsibilities for the magazine.

So enjoy this magazine...and KEEP THINKING GREEN.

BACK TO TABLE OF CONTENTS

What's That Smell training summary

By Sarah Leavitt

The Combined Committee is the WEAU chairs from Pretreatment, Collections, Laboratory, Biosolids, Safety and Public Relations. For over the six months we have been working together to host a training entitled "What's That Smell." On January 27, 2015 at the Utah Local Government Trust building we were final able to host this training. The objective was to teach us how to change the public image of the "smelly" wastewater and know how to handle complaints.

The first speaker was Mike Cottam. His energetic personality really set the tone for the day. Mike taught the importance of self-image which in the end relates to public image for you in the work place. Throughout Mike's presentation there was participation from the audience, which was a lot of fun. I wish each of you were at this presentation because a summary does not give it justice but here are a few highlights.

Mike showed the value of yourself by using a dollar bill supplied by Blair Blonquist which was folded up during a magic trick and destroyed, but Blair was rewarded with a ten dollar bill; which goes to show volunteering has its rewards. Blair was a good sport, thank you.

Mike had a Wizard of Oz skit, which everyone enjoyed. The characters were played by Lori Gord from South Valley Water Reclamation Facility, Loren Willes from Orem City, Randy Passey from Cottonwood Special Improvement District and Judy Etherington from DWQ. Each "actor" received a balloon hat and will now be referred to as Dorothy formally known as Lori, Scarecrow formally known as Loren, Tin Man formally known as Randy and Lion formally known as Judy. Everyone left with the understanding that we can all change by being true to ourselves. The one thing about this skit is that you really needed to be there to get the whole effect. Thank you to Lori, Loren, Randy and Judy, you helped make the skit hilarious.

There were other activities in Mike's presentation such as Danny Slater from Central Weber becoming the Sheriff and Rex Ausburn the "son." Mike also read "The Dog Poop Initiative" and told the story behind the book and how we can all become scoopers and not pointers.

> "Everyone left with the understanding that we can all change by being true to ourselves.

The next presenter was Cheryl Snapp Conner from Snapp Conner. Snapp Conner is one of the largest Public Relations companies in Utah and was founded by Cheryl. Her presentation was very informative and went over some public relations tips that everyone could use. She told us that we are in charge of our personal brand and our entities brand. We need to be engaged in social media and put positive information out there. She recommended writing press releases about the positive activities your entities are engaged in but to be careful about the headlines because a bad headline can be a media feast. She encouraged entities to have a blog and to use hashtags #. The benefits of hashtags are they help people find you. She also recommended utilizing google alerts (*www.google.com/alerts*) by setting up your entity on google alerts so you know when your entity is being discussed. It is google idea to go to google alerts and search for your entity or even yourself.

Before the afternoon presentations began, we had a little technical difficulty, we were just glad Paul Krauth was there to save the day. After lunch each Committee presented ways they advance public image through their work assignments. Each presentation was informative and a lot of great ideas were shared.

In the end, the training was well received with over seventy people attending. We would like to thank those who attended and also thank their supervisors for allowing them to attend.

I was personally impressed with the clean-up efforts of everyone after the training. The Committee was under the impression that we needed to clean the tables, take out the trash, vacuum and clean anything else. It was awesome to see everyone jump in and clean-up. Your help was appreciated.

If you have any training topics you would like to attend or present please contact *weautraining@gmail.com*.

2015 Call for papers

Region 8 Pretreatment Association Annual Conference
April 14 – 16, 2015
Best Western Abby Inn
St. George, Utah

The Region 8 Pretreatment Association (R8PA) is requesting abstracts of technical presentations for the annual R8PA conference. Abstracts should be related the following topic categories:

- Pretreatment Program Requirements
- Enforcement
- Financing/Rate Studies
- Mercury Control Programs
- Sector Control Program
- Development of Local Limits
- Inspections of IUs/SIUs
- Safety
- Industrial Treatment
- Innovative Treatment Equipment and Technology
- Instrumentation/Process Control
- Water Reclamation and Reuse
- Regulatory Requirements for Pretreatment, IUs, SIUs and/or CIUs
- Implementation of Pretreatment Program
- Sampling/Lab Procedures
- Trouble Shooting
- Pollution Prevention Programs
- Energy Management
- Public Involvement/Outreach
- Sustainability, GHG Emissions, Biofuels
- Utility Management

R8PA members are comprised of pretreatment professionals. The conference is expected to have over 125 attendees and provide an opportunity to present important findings in the field of water quality and pretreatment.

Abstracts should be brief (maximum of 200 words) yet fully define the presentation. Abstracts must be submitted to *Region8PA@gmail.com* by March 16, 2015. R8PA does not require the submittal of a formal paper to make a presentation. However, an electronic copy of the final presentation is requested to be submitted prior to the conference so that it can be uploaded to the R8PA website.

Information required

Name:
Presentation Title:
Employer/Organization:
E-mail:
Address:
Phone Number:
Abstract: DH

The life of a PWO rep

By John Marteliz

I have enjoyed my time as the PWO Rep this past year. But if I would have known how time consuming it was, I might have thought twice before taking the position. From organizing operators trainings throughout the year, to attending all the meetings, to the Operation Challenge event, you stay pretty busy. And let's not forget about writing articles for the *Digested News*. No one informed me I had to be a writer when I started as the PWO Rep. They basically blindside you with all the "fun" stuff you have to do. I've had some predecessors that have paved the way for me though. Under the tutelage of Brett Olsen, I was taught the most important tool of a PWO Rep... Delegation!!! Brett was a fantastic PWO Rep. He raised the bar of the rep. Pfft, thanks a lot for that, Brett. This year I'm tutoring Gordan Evans. Poor Gordan. He is going to be so lost next year when he takes over for me. To be honest, I am very fortunate to have someone like Gordan with me. He brings with him a vast array of knowledge that is crucial to the continued development of Operators. He was instrumental in developing the Operations track at our mid year conference this year. Needless to say, he has been a great asset to me.

I have met a lot of people through this experience, for which I am very grateful. I think my friends list went from two to maybe 20 now. I'd like to thank a few individuals. Tim Madsen has been key in running our Operations Challenge in St. George for last year and this current year. Before him it was Marlo Davis. Those two have made the life of the PWO Rep so much easier by handling numerous responsibilities of the Ops Challenge. I'd like to acknowledge Ron Clements. If it wasn't for him, I wouldn't have had this opportunity to serve as the PWO Rep. I'm just wondering what I did to the guy for him to seek revenge in such a manner. Ron is as good as they come. For a guy with no neck, you're okay in my book, brother. Paul Krauth is another one that I'd like to thank. Paul has provided several training seminars for Operators. And with Paul and his seminars, you know you're always going to eat well.

I'd like to encourage all of you to get involved with WEAU. Whether it's serving on a committee or serving on the board, try to become part of it. It's such a valuable resource to expand your knowledge of our industry and to meet people from different plants and districts. I hope everyone had a wonderful holiday season and were able to bless someone less fortunate in this world. Thank you all and God bless.

2014 WEFTEC Operator's Challenge

By John Marteliz

This year's Challenge was full of surprises at WEFTEC. Well in all honesty, it started here in Salt Lake with the All-star team having to switch their coach out for one of their teammates due to an injury. I don't know what it is about those Central Valley boys, but they will do just about anything to get out of competing at Nationals. Delaun Fullmer stepped up to compete and with little practice with their new teammate, the All-star team did a great job in New Orleans. North Davis had to face some adversity as well, as one of their team members from St. George was unable to attend WEFTEC and compete at Nationals. They had to scrape the bottom of the barrel and have Brian Lamar compete. I know what you're all thinking, who would be that desperate. Obliviously they were. North Davis had an outstanding showing in New Orleans with a 1st place finish in maintenance and a 3rd place finish in lab. North Davis finished 7th overall. The Wasatch All-stars placed 6th in collections and 7th place in lab. The Wasatch All-stars finished 14th overall. The teams really supported each other and helped one another out this year. It's amazing how some people respond to adversity when there is a problem facing them. I feel it's a direct correlation to our unique industry and the problems we have to face on a daily basis.

The North Davis Royal Flush team members are Captain Gordon Call, Tyler Barfuss, Tom Anderson, Brian "the Tractor" Lamar, and Coach Mark Mudrow. The Wasatch All-Stars team members are Captain Dan Watts, Delaun Fullmer, Trace Workman, Bryant Thacker, and Coach James "Gimpy" Magill. I would like to thank all of the entities, management, WEAU board, and our fellow co-workers for allowing our teams to compete and for picking up the slack when these guys are away practicing or competing. This would not be possible if we didn't have the support and understanding from all of you. DN

> "It's amazing how some people respond to adversity when there is a problem facing them."

W.E.A.U. SCHOLARSHIP/GRANT

Cody Snyder

By Gordon Evans

Cody Snyder started his career in Wastewater when he was hired as a seasonal worker by Snyderville Basin Sewer Improvement District. It didn't take long before a position opened and because of his strong work ethic he was offered a change to become an operator. Since then Cody has taken and passed his Wastewater Certifications and is currently a grade IV unrestricted operator. Cody has been active as an operator with the Operations Challenge and has competed on Snyderville's teams for many years. He has also participated with the Utah All-Star team in San Diego, Chicago and New Orleans. His competitive nature has allowed the teams to do well and even place in the national competition. Cody is one of those operators who believes that for a plant to work well it also must look good. He could spend hours cutting the grass and making sure that it looked perfect. He also hated thistles and Cody and I could spend many hours spraying to keep them at bay. Often times his favorite words while doing his spraying was "Die sucker" as he sprayed the toxic mix of weed killer on them.

Cody is a now the Plant Supervisor at Snyderville Basin and is primarily in charge of the day to day operation of the Silver Creek treatment plant. The Silver Creek facility is preparing to undergo a major re-construction which will be a very big undertaking for him as he gets involved with the day to day business of construction.

Cody has many loves in his life; the most important is his family. He married Dori in 1994 and since then has added three beautiful Daughters, Jade 18, Mylee 14, and Averie 11. Cody often said that God hated him for giving him all girls, but they are his pride and joy's and he loves to do things with them. Currently there are three things that occupy Cody's time when he is not working. His three girls play nearly every possible sport they can. He attends several games every week such as basketball, softball, volleyball, soccer and karate. He even throws in a little cheerleading which "forces" him to watch the boys' basketball and football games as well. It all depends on the season. He also coaches Averie's basketball team so he attends those practices too. And if it's warm enough he will try and add some golf for himself.

Besides his family, work and raising "GIRLS", Cody has ventured into being a Cattle Barron and now is a lowly sheep herder. Cody and Dori have been involved with their daughters in the local 4-H and together they have produced many award winning sheep, some having been purchased back at auction at a very high price, since his girls fell in love with them. He loves animals and aside from raising, breeding and selling sheep, he has horses as well as cows. In addition, he has goats, chickens and a turkey around his home in Peoa, Utah. Dori says he spends way too much time in the barn. His favorite animal is his giant Chihuahua "Beans", which is actually a MinPin that absolutely adores Cody.

He is also an avid sports fan and a fierce competitor as anyone who has competed with or against him in the operations challenge will know. His Mother said that when he was in High School, he was awarded the "Mr. Basketball" award, which caused him to have to wear his mom's prom dress. It was quite lovely but wouldn't zip up in the back. He has played county rec. baseball, softball and basketball with his friends for many years and even ventured into bowling for a while. Cody is also an excellent golfer and can hit a ball farther

than anyone I know. One of his favorite ways to play when with his friends is to have the player that hits a hook or slice or does not make the green on a par 3, tee off on the next hole with their pants around their ankles. Any free time he manages to have which seems to be decreasing daily according to Dori is spent camping with his family and friends on summer weekends. Some of their favorite places to go are Lava Hot Springs, Manti, Moab, and any other place that they can think of going.

If you don't already know Cody, take the time to get to know him. He is a great guy and fun to be around. Also for those of you who don't know, Jill Houston is his Aunt; maybe this explains some of where he gets his fun loving personality and sense of humor from. DN

"Cody is a now the Plant Supervisor at Snyderville Basin and is primarily in charge of the day to day operation of the Silver Creek treatment plant."

Jared O'Brien

Jared O'Brien has been employed with Central Valley Water Reclamation Facility for 12 years. During that time he has received his Grade IV Operations certification as well as his Grade III Technologist certification. He also has studied diesel systems technology at Salt Lake Community College. Jared currently sits on the board as a player agent for the Oquirrh Park baseball league. When Jared has free time he enjoys spending it with his family. Jared and his wife are very proud of their two kids. They have an eight-year-old son and a four-year-old daughter. His family loves to go camping, fishing, or just about anything to do with the outdoors.

Jared is one of the nicest guys I have ever known. I remember when we were both practicing for Nationals. I was on the All-star team and Jared was on the Central Valley team that year. We both were doing the same part on the maintenance event. That was my first time ever doing that part of the pump and I struggled at first learning it all. Being the type of guy Jared is, he recognised this and helped me learn it. He taught me his routine and low and behold, my team ended up taking first place at Nationals in the maintenance event.

Jared is a great friend and I appreciate all that you have done for me. Especially for Nationals buddy. dn

Rob Jaterka

Rob Jaterka has been employed with Magna Water for 15 years. He spent five years on the Meter crew before transferring to the Collections crew. Rob has his Grade IV Water Distribution, Grade IV Water Treatment, and Grade IV Collections certifications. He also has been lucky twice now to be asked by the Division of Drinking Water to evaluate the state drinking water. Rob is currently certified as a DRC in water and sewer. Rob and his wife have two daughters that are 13 and 10. In his free time Rob enjoys the outdoors, bow hunting, and riding horses. Rob and his kids compete in the Extreme Horseman Challenge where Rob won the reverse challenge in the extreme division. Hmm, he might want to elaborate on that challenge and what the "reverse" challenge means. Watching his children compete in ranch rodeos is another thing Rob likes to do. Rob enjoys many things about horses from shoeing them to starting his colt. The Jaterka family also enjoys helping friends work their cattle, from gathering cow calf pairs to branding.

Rob is an outstanding man and his involvement with the Operations Challenge has been crucial for its development to where it is today. Rob's drive and passion is one of the main reasons why Magna is so good at the Ops. Challenge. I've appreciate getting to know Rob these past few years and look forward to learning more about him in the future. dn

Phosphorous in wastewater

By Shelly Jorgensen

Phosphorus and surface waters

Eutrophication and algal bloom

Eutrophication is a term that describes nutrient dense water. The origin of the word is likely Greek and refers to being 'well-fed.' In the past, the word was used to describe a natural phenomenon when a deep, nutrient-poor lake became more nutrient dense, therefore supporting more plant and animal life, and eventually filled in to become a marsh. The term is commonly used to describe fresh or marine water that has been affected by anthropogenic sources, which over-stimulated plant and algal growth and caused an imbalance in the aquatic system [1].

Phosphorus is an important element in living organisms because it is a component of DNA, the genetic material found in plant cells, which regulates protein synthesis, cell division, development of new tissue, and metabolic energy functions [2]. The presence of phosphorus in an aqueous habitat is essential for plant growth, but, in excess, can cause an imbalance in the system. In a freshwater aquatic system, phosphorus may be the limiting nutrient – contributing to low growth when phosphorus levels are low, and excessive growth when levels are high.

Elevated levels of phosphorus in an aquatic system contribute to excessive algal growth, which can have numerous detrimental effects. Some algae may release toxins that are harmful to humans and animals. Algal bloom, a situation with excessive algal growth, creates an environment with decreased clarity of the water, where submerged vegetation may not be able to get enough sunlight for growth. Because plants release oxygen when they transpire, there is a high level of oxygen in the water during the day, but a deficit at night. Also, when the algae dies and decomposes, it creates more oxygen-demanding material, which decreases the amount of dissolved oxygen available to plants and fish and may cause hypoxia, as a term used to describe dissolved oxygen concentrations that are lower than 1.0 mg/L [3]. The ideal dissolved oxygen concentration for many fish is 7-9 mg/L, and most fish cannot survive when dissolved oxygen levels drop below 3 mg/L. Trout require a higher level of dissolved oxygen - the optimal concentration of dissolved oxygen for adult brown trout is 9-12 mg/L [4].

Aerial view of the Snyderville Basin Water Reclamation District that was captured from Google Earth.

Contributors of phosphorus to surface waters

The nutrients typically responsible for eutrophication are nitrogen and phosphorus. Anthropogenic sources of these nutrients include sewage, atmospheric deposition, groundwater flow, agriculture and aquaculture runoff and discharge. Because humans excrete 86% of the phosphorus they consume, wastewater (sewage) contains significant amounts of phosphorus [3].

Phosphorus is a naturally occurring element in rock, and weathering of rock can contribute to phosphorus levels in surface waters. In the Park City area, there is a natural geologic formation called the Park City Phosphoria Formation that has high concentrations of phosphorus (10-100

times background concentrations). Erosion of this formation, from storms or especially from construction, can contribute to elevated phosphorus levels in East Canyon Creek and East Canyon Reservoir [5].

State regulations for phosphorus

Treated wastewater with high levels of phosphorus that is released into surface water can have a great impact on the balance of the freshwater system – impacting the health of the plants and animals that live in the water, as well as recreational usage of the water. Many states recognize this as a problem and are regulating the amount of phosphorus that is allowed in effluent from WWTPs that discharge into surface waters. In July 2010, Utah enacted a law regulating sales of dishwashing detergents high in phosphorus by prohibiting retailers from selling dishwashing detergents with phosphorus levels greater than 0.5% by weight (*HB 303 Phosphorus Limit in Dishwashing Detergents*). This was an attempt to decrease phosphorus entering WWTPs – few treatment plants in Utah were equipped to remove phosphorus at that time – and, therefore, decrease the amount that had to be removed. That law was repealed in January 2011 (*HB0246 Repeal of Phosphorus Limit in Dishwashing Detergents*)[6].

In October 2014, a press release from the Utah Department of Environmental Quality announced the presence of microcystin, a cyanotoxin often found in algal blooms, in samples taken from Utah Lake. The release stated that one of the major contributors to algal blooms is phosphorus, and claimed that 75% of the phosphorus in the lake comes from WWTPs that discharge into Utah Lake. They assert that reducing nutrient loading in lakes and streams is a top priority and are addressing these concerns with the *Utah Nutrient Strategy* [7].

In June 2014, the Utah Department of Environmental Quality: Division of Water Quality published an information sheet about how the *Utah's Nutrient Control Strategy* will be implemented. With regard to WWTPs, the following guideline was released: "All mechanical treatment works discharging to surface waters will have to meet an annual mean total phosphorus limit of 1.0 mg/L by January 1, 2020" [8].

There is not a statewide limit on phosphorus in wastewater effluent, but the Snyderville Basin Water Reclamation District has specific limits on how much phosphorus they can release per year because of the great impact they have on the water quality of the East Canyon Creek and East Canyon Reservoir. Yearly, they are allowed to release a total of 1,926 lbs. of phosphorus (dry weight). During the months of July, August and September, they are only allowed 323 lbs. (dry weight) [9]. They accomplish this by biological and chemical means as described in Section 4.0.

Snyderville Basin Water Reclamation District

The Snyderville Basin Water Reclamation District (WRD) is located in Park City Utah, a beautiful mountain village nestled in the Wasatch Mountains. It is home to numerous ski resorts, and the city's population varies dramatically from season to season. For three months of the year,

East Canyon Reservoir

East Canyon Creek

Phosphorous in wastewater

during the ski season, the average flow of the plant is 4 MGD, but only 2 MGD during other times of the year [9].

Park City is a resort community whose livelihood depends on maintaining the pristine beauty of its natural surroundings. This places a unique responsibility on the Snyderville Basin WRD for a couple of reasons; the most important one being that, because of dry conditions during the summer months, the Snyderville Basin WRD "is the stream." In 2003, during a particularly dry season, the East Canyon Creek was completely dry. The effluent released from the plant has to be of high enough quality for trout fishery in East Canyon Creek and eventually East Canyon Reservoir. Trout require higher levels of dissolved oxygen than other species of fish, so limiting phosphorus in the effluent is necessary for them to thrive.

Another unique concern is that the plant is situated adjacent to the Jeremy Ranch Golf Course and many large vacation homes, so the plant's appearance and odor must be scrupulously maintained. All clarifiers at the plant are covered, and the surrounding community chose the color of the paint used for the roofs of the clarifiers. The community is very concerned about the plant's impact on the environment.

Water treatment at Snyderville Basin Water Reclamation District

Because the Snyderville Basin WRD "is the stream" for the summer months of the year, it is critical that phosphorus levels be optimal. As a result, they are the first WWTP in the state of Utah to remove phosphorus from its treated water. Figure 1 diagrams the path of wastewater as it travels through the Snyderville Basin WRD plant, and the paragraphs below outline how they accomplish their phosphorus removal.

Headworks

Step Screen in the Headworks Building

The first stop for wastewater entering the Snyderville Basin WRD is the Headworks building where pretreatment of the influent occurs. Step screens are used to remove 'rags' from the influent, and then grit, which is small enough to make it through the step screens, but heavy enough to settle out, is removed with a centrifuge. The 'rags' and grit are dumped

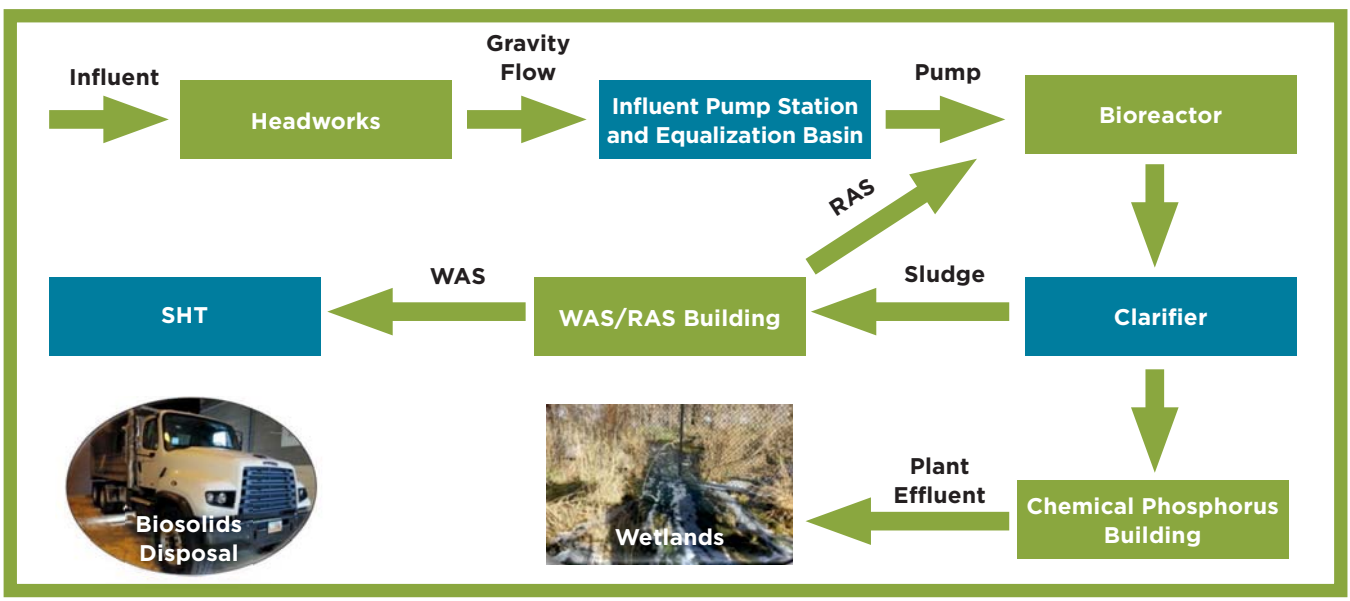


Figure 1. Flow chart of the treatment process for wastewater by the Snyderville Basin WRD

Aerobic zone of bioreactor

into large garbage bins for disposal. As the influent is going through this pretreatment process, the air is scrubbed to remove odor, and, surprisingly, there is little foul odor associated with the waste in the garbage bins.

Influent pump station (IPS) and equalization basin

The equalization basin for the Snyderville Basin WRD, which helps maintain a constant flow to the plant, is completely underground and anaerobic – meaning that it contains no free, dissolved or bound oxygen [10]. Because of drastic differences in inflow during the ski season and the film festival, it is important to be able to equalize flow to the plant. The influent gravity flows into the 0.6 million gallon equalization basin and then is pumped to the bioreactor [9].

The anaerobic environment in the equalization basin is critical for encouraging the production of volatile fatty acids (VFAs), which are also known as short-chain fatty acids (SCFA) because they are composed of carbon chains with six carbons or less. This is similar to the fermentation process of breaking down carbohydrates into short chain fatty acids that occurs in the human digestive system, another anaerobic environment. The VFAs play an important role in the biological removal of phosphorus that occurs in the bioreactor, the next step in the process.

Bioreactor

Biological processes may be used to remove phosphorus from wastewater. Enhanced Biological Phosphorus Removal (EBPR) systems are designed to foster communities of microorganisms that will uptake higher levels of phosphorus than typical. These microorganisms are commonly called phosphorus accumulating organisms (PAOs), because, as the name implies, they accumulate phosphorus. They are made up of a variety of bacterial species including; Acinetobacter, Rhodocyclus and some morphologically identified coccus-shaped bacteria [11]. PAOs are a facultative bacterium, which means that they can live in an aerobic or anaerobic environment.

EBPR systems require a strictly maintained anaerobic zone, followed by an aerobic zone. A critical component to the success of an EBPR system is an adequate source of VFAs for the PAOs in the anaerobic zone, which is achieved with a minimum BOD:P ratio of 25:1 [10].

The bioreactor at the Snyderville Basin WRD is where the initial process for phosphorus removal occurs (see Figure 2). The first tank in the bioreactor receives a stream of influent from the equalization basin, as well as return activated sludge (RAS), which is rich in phosphorus accumulating organisms (PAOs). The RAS stream is important for maintaining an appropriate BOD:P ratio because the plant influent varies. Volatile fatty acids (VFAs) are the food of choice for the PAOs, and, in the anaerobic environment, they use VFAs for energy and release phosphorus.

The wastewater then moves through an anoxic zone (meaning available oxygen is bound to other molecules) to the aerated zone of the bioreactor, where the PAOs behave differently in the presence of oxygen and feast on phosphorus. This 'luxury uptake' is 2-3 times more phosphorus than what they absorbed previously. This is where most of the phosphorus removal happens. The wastewater entering the bioreactor typically contains 5.0 mg/L phosphorus, but, by the time it leaves the bioreactor, it is down to 0.2 mg/L phosphorus, a 96% removal rate. This amount of removal would leave the equivalent of approximately 2.5 lbs/day in the effluent (on a dry basis). Calculation 1 shows how to determine pounds of dry phosphorus per day remaining in the effluent.

The concentrations of phosphorus in the influent are measured in mg/L. Because this is equivalent to parts per million (ppm), ppm – which is essentially unit-less – a simple way to calculate pounds of phosphorus per day without a complicated conversion is to replace mg/L with ppm.

$$(1.5\ MGD)\left(\frac{8.34\ lbs}{gal}\right)(0.2\ ppm) = 2.5\ lbs\ phosphorus/day$$

Calculation 1

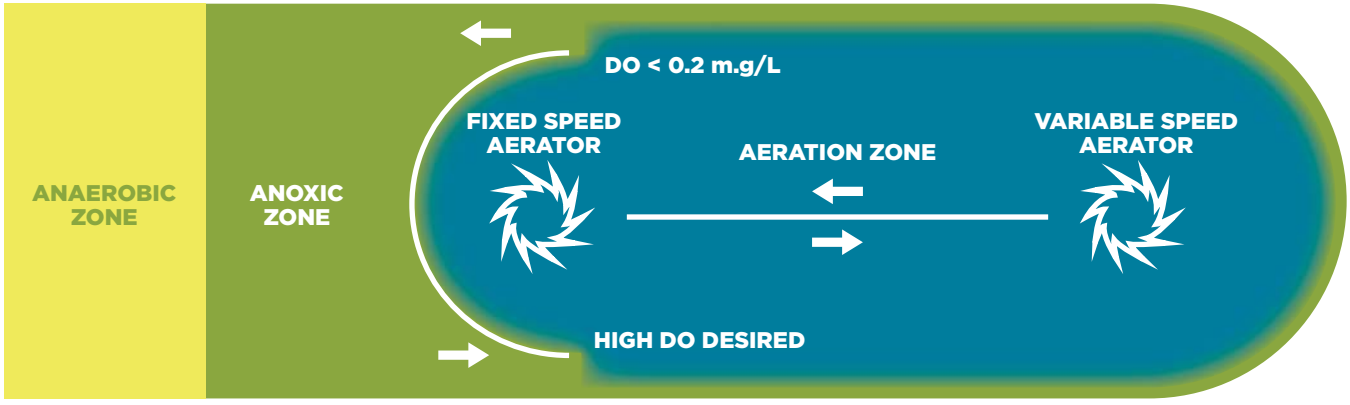


Figure 2. Diagram of bioreactor at Snyderville Basin WRD . Source: SBWRD.

Phosphorous in wastewater

Aerobic zone of bioreactor

Clear water being collected over weirs at the edges of the secondary clarifier

During the summer months when they are only allowed to release 323 lbs. of phosphorus total, this high level of removal is essential. After just the biological treatment, they would release 225 lbs in 90 days [9].

Secondary clarifiers

The bioreactor effluent is sent to the secondary clarifiers where sludge, a semi-solid slurry containing phosphorus and other solids, is settled out. Treatment in the clarifiers is a physical process. A long skimmer arm rotates around the bottom of the circular tank and collects the sludge into a conical depression in the center. Clear water is collected around the edges of the tank as it flows over small weirs.

$$(1.5\ MGD)\left(\frac{8.34\ lbs}{gal}\right)(0.01\ ppm) = 0.125\ lbs\ phosphorus/day$$

Calculation 2

The destination for the sludge is the RAS/WAS building, while the clear water goes to the Chemical Phosphorus Building.

Return activated sludge (RAS)/ waste activated sludge (WAS)

Sludge from the secondary clarifier goes to the Return Activated Sludge (RAS)/Waste Activated Sludge (WAS) Building next. This building is a transfer station, and some of the sludge is sent back to the anaerobic zone of the bioreactor to provide PAOs and BOD load; hence the term return activated sludge. The rest of the sludge, the waste activated sludge (WAS), is sent to the sludge holding tank (SHT) where it will be wasted.

Sludge holding tank (SHT)

The sludge holding tank (SHT) is mainly a storage location for the sludge before it is removed from the plant. It is kept aerated to avoid fermentation and a resulting odor. A polymer is added and the sludge is dewatered through a centrifuge which helps to separate the solids and decrease the water content of the sludge. At this point, it is about 12% solids.

Residual waste (bio solids)

The sludge in the SHT is taken by truck to a landfill where it is mixed with sawdust and other organic material and used to cap the landfill. It costs less, only $18 per ton, to dispose of the sludge because it is performing a useful purpose.

Holding tank for liquid alum used for chemical phosphorus removal

Ultraviolet disinfection of water

Chemical Phosphorus Building

Chemical removal of phosphorus can be accomplished by adding metal salts, which bind with the soluble form of phosphate in the wastewater and form a precipitate that can be removed by settling or filtration. Commonly used metal salts include; alum (aluminum sulfate), sodium aluminate, ferric chloride, ferric sulfate, ferrous sulfate, and ferrous chloride [11].

In the Chemical Phosphorus Building at the Snyderville Basin WRD, the clear water collected in the secondary clarifier undergoes further treatment to remove phosphorus. By performing the chemical phosphorus removal after the biological removal process, the efficiency of the PAOs is optimized because the PAOs are not subjected to pH changes or harsh chemicals. The Snyderville Basin WRD uses liquid alum, which is flash mixed with the effluent from the secondary clarifier. This causes a coagulation process in which phosphate is bound to aluminum as shown in the reaction below. The optimal range of pH for alum is between 5.5 and 7.0 [2].

$$Al_2(SO_4)_3 + 2HPO_4^{2-} \leftrightarrow 2AlPO_4 \downarrow + 2H^+ + 3SO_4^{2-}$$

Continuous backwash up-flow filters are then used to remove the particles formed by the coagulation process. The chemical process is capable of taking the phosphorus levels in the water down to 0.01 mg/L.

The dirty water goes back to the IPS to make another trip through the plant, while the clean water is treated with UV light (253 nm) to disinfect the water before releasing it to the wetlands. This disinfection does not kill everything, nor does it leave a residual in the water, but it destroys enough pathogens to meet their effluent restrictions and they do not want any residual going into the East Canyon Creek.

Wetlands

Plant effluent cascading over rocks before entering the wetlands

After leaving the Chemical Phosphorus Building, the plant effluent cascades over rocks in a picturesque manner before it enters a wetlands area and then becomes part of East Canyon Creek. The cascading over the rocks is not just for visual effect, it performs the important function of aeration, ensuring that the water is fully oxygenated before it joins the creek. After the biological and chemical phosphorus removal treatments, the effluent contains only 0.125 lbs phosphorus per day, which is equivelant to less than 12 lbs of dry phosphorus in a three-month period and less than 46 lbs a year.

Conclusion

Limiting phosphorus levels in effluent from WWTPs is an important factor in preserving the delicate nutrient balance in the receiving bodies of water. Many states are becoming aware of the need to regulate phosphorus in WWTP effluent. The Snyderville Basin Water Reclamation District became the first WWTP in Utah to practice phosphorus removal because of the critical role it has in the well-being of East Canyon Creek and East Canyon Reservoir. Through an optimized biological and chemical treatment process, they are able to meet stringent state requirements for phosphorus in their effluent and provide water suitable for trout fishery, as well as other recreational activities bounteous in the Park City area.

End notes

(1) Anderson, Donald M., Patricia M. Glibert, and Joann M. Burkholder. 'Harmful Algal Blooms and Eutrophication: Nutrient Sources, Composition, and Consequences.' *Estuaries* 25.4 (2002): 704-26. Web.

(2) 'Soils - Part 6: Phosphorus and Potassium in the Soil.' *Plant and Soil Sciences* eLibrary. USDA, 2014. Web. 28 Nov. 2014.

(3) Davis, Mackenzie Leo. *Principles of Environmental Engineering and Science*. 3rd ed. S.l.: Mcgraw Hill Higher Educat, 2014. Print

(4) Murphy, Sheila. 'General Information on Dissolved Oxygen.' *BASIN*. City of Boulder/USGS Water Quality Monitoring, n.d. Web. 02 Dec. 2014.

(5) Snyderville Basin Water Reclamation District. *Is Your Project Located on a Phosphorus-rich Soil?* Park City: Snyderville Basin Water Reclamation District, n.d. Print.

(6) 'Utah DEQ: DWQ: Reducing Phosphorus Pollution.' *Utah DEQ: DWQ: Reducing Phosphorus Pollution*. Utah Department of Environmental Quality, 17 June 2014. Web. 29 Nov. 2014.

(7) State of Utah. Department of Environmental Quality. *Utah Lake Test Results Confirm Presence of Toxin.* N.p., 9 Oct. 2014. Web. 19 Nov. 2014.

(8) 'Utah DEQ: References: Fact Sheets.' *Utah DEQ: References: Fact Sheets, Implementing Utah's Nutrient Control Strategy.* Utah DEQ, June 2014. Web. 29 Nov. 2014.

(9) Burrell, Chad W. 'Site Tour of Snyderville Basin Water Reclamation District.' Personal interview. 26 Nov. 2014.

(10) Wisconsin Department of Natural Resources. I*ntroduction to Phosphorus Removal Study Guide*. n.p., 2009. Web. 19 Nov. 2014.

(11) USA. Minnesota Pollution Control Agency. Municipal Division. *Phosphorus Treatment and Removal Technologies*. n.p., 2006. Wq-wwtp9-02. Minnesota Pollution Control Agency. Web. 1 Dec. 2014.

Situational Awareness

Situational awareness is being aware of what is happening around you in terms of where you are, where you are supposed to be, and whether anyone or anything around you is a threat to your health and safety.

Improve your situational awareness, get in the habit of regularly pausing to make a quick mental assessment of your working environment. When doing so, consider the following questions:

- Is there anything around you that poses a threat to your health and safety and if so, to what extent?
- Is the threat big enough that you should stop working?
- Is there anything you can do to safely reduce that threat in order that you can carry on working safely? (PPE, fall protection, cleanup a spill, etc.)

If you see something unsafe or spot a hazard, don't walk by – take responsibility to deal with it. If you feel you are in any immediate danger to your health or safety STOP work immediately and inform your supervisor.

Wastewater operators, maintenance, laboratory, and collections system personnel are confronted by a great many hazards each day, please take a moment to recognize the hazards you work around so you may avoid them and any accidents they may cause. DN

WEAU Safety Committee
Contact us:
csimmons@ndsd.org

Eye Protection

Every day an estimated 1,000 eye injuries occur in American workplaces. No matter where we work, flying particles, dusts, splashes or flying objects are apt to expose us to potential eye injury. Fortunately, we can protect against these hazards by using the appropriate protective eyewear for our jobs.

A survey by the Labor Department's Bureau of Labor Statistics (BLS) of about 1,000 minor eye injuries reveals how and why many on-the-job accidents occur:

- Not wearing eye protection. BLS reports that nearly three out of every five workers injured were not wearing eye protection at the time of the accident.
- Wearing the wrong kind of eye protection for the job. About 40 of the injured workers were wearing some form of eye protection when the accident occurred. These workers were most likely to be wearing eyeglasses with no side shields, though injuries among employees wearing full-cup or flat-fold side shields occurred, as well.

What Causes Eye Injuries?

- Flying particles. BLS found that almost 70% of the accidents studied resulted from flying or falling objects or sparks striking the eye. Injured workers estimated that nearly three-fifths of the objects were smaller than a pin head. Most of the particles were said to be traveling faster than a hand-thrown object when the accident occurred.
- Contact with chemicals caused one-fifth of the injuries.
- Other accidents were caused by objects swinging from a fixed or attached position, like tree limbs, ropes, chains, or tools which were pulled into the eye while the worker was using them.

That is how eye injuries occur... *Please Use Proper Eye Protection!* DN

WEAU Safety Committee
Contact us:
csimmons@ndsd.org

New 10K Muffin Monster® sewage grinder from JWC Environmental packs tough grinding power in a compact package

COSTA MESA, Calif. — The new 10K Series Muffin Monster® from JWC Environmental combines superior waste grinding capabilities in a compact, easy-to-install unit that's perfectly suited to a variety of wastewater grinding applications. This newest addition to the hard-working family of Muffin Monster grinders is available in pipeline, open channel and pump station configurations that pack big power in a small package.

The 10K Series Muffin Monster® incorporates the same benefits of the larger Monster units, including low-speed operation with high torque and less interrupts. The dual-shaft design actively pulls material into and through the hardened steel cutters, so the grinder can handle a wider variety of debris compared to single-shaft macerators and grinders.

To shred sewer-clogging solids commonly found in waste streams, the 10K Series comes equipped with both top and bottom bearings that prevent shaft deflection. This robust design feature not found in lesser grinders or macerators ensures the longevity of the product and drastically reduces maintenance costs, downtime and operator inconvenience. The smaller particles produced by the 10K units also pass more easily through downstream pumps and pipelines.

The 10K open channel Muffin Monster is an ideal, low-cost solution for smaller wet wells located in facilities such as office buildings, apartment complexes, resorts, retail centers and package treatment plants. Custom stainless steel support frames allow for installation directly at the inlet sewage line on the wall of a pump station or into an existing channel.

The 10K in-line Muffin Monster is ideally suited for protecting sludge pumps, sentive centrifuges, samplers or heat exchangers in resource recovery facilites. The 2 or 3 hp (1.5 or 2.2 kW) motors provide all the cutting force required to shred tough solids. Its efficient dual-shafted grinding technolology will not get clogged by wipes or other non-dispersables as is common with high speed macerators. For added versatility and performance, the 10K Series units are available with 7-, 11- or 13-tooth cutter combinations to fit individual customer applications.

JWC is committed to providing dynamic, reliable products to further combat wipes and other non-dispersibles in the waste stream, and the 10K Series is another addition to the industry-leading Muffin Monster lineup. DN

About JWC Environmental

Since its founding in 1973, JWC Environmental has become a world leader in solids reduction and removal for the wastewater industry with its Muffin Monster grinders and Monster screening, compaction and washing systems. JWC also solves challenging size reduction and processing problems in commercial and industrial applications through its Monster Industrial division. JWC Environmental is headquartered in Costa Mesa, California and has a global network of representatives, distributors and regional service centers to provide customer support. For more information, visit JWC Environmental at *www.jwce.com*.

Editorial Contacts:

Erika Schrader
1 515 557 2236
FAX: 1 515 557 2001
erikas@2rm.com

Kevin Bates
1 714 428 4647
kevinb@jwce.com

UV Disinfection and Advanced Oxidation

a new way of tackling old problems.

Jon C McClean
President, ETS –UV by Neptune Benson

Modern drinking water facilities face an array of complex and sometimes contradictory problems. On one hand the need to treat micro-organisms that are becoming increasingly chlorine tolerant, whilst driving down the disinfection byproducts caused by high doses of chlorine, and at the same time treat the new contaminants that are emerging such as pesticides, caused by more intensive land use, or pharmaceutical products consumed in ever increasing quantities by an ageing population, or synthetic organics washing into the aquifer. These emerging contaminants are collectively called Compounds of Emerging Concern (CEC).

Water scarcity will inevitably lead to more reuse of water, which will highlight the need to develop and add process barriers to remove these contaminants from the water supply, and the processes that we use can't exacerbate this issue. Few conventional drinking water processes can address these emerging issues , and almost no conventional municipal wastewater process is capable of targeting these problem compounds.

Metabolized and un-metabolized Pharmaceutical and Personal Care Products (PPCP's) are not new, however their potential to cause effect on living tissue is now subject to much scrutiny. A study [1] by the U.S. Geological Survey published in 2002 brought attention to PPCPs in water. Following sampling of 139 susceptible streams in 30 states, detectable quantities of PPCPs were found in 80 percent of the streams.

PPCPs include:

- Sun-screen products
- Prescription and over-the counter therapeutic drugs
- Diagnostic agents
- Veterinary drugs
- Fragrances
- Cosmetics
- Nutraceuticals (e.g., vitamins)

Sources of PPCPs:

- Agribusiness
- Residues from hospitals
- Human activity
- Residues from pharmaceutical manufacturing (well defined and controlled)
- Illicit drugs
- Veterinary drug use, especially antibiotics and steroids

The US EPA maintains an active program called the Contaminant Candidate List (CCL) to identify contaminants in public drinking water that warrant detailed study, and may require regulation under the Safe Drinking Water Act (SDWA). The most recent Contaminant Candidate List, CCL3 was finalized on September 22, 2009, and contained 104 chemicals or chemical groups, 12 microbiological contaminants, and for the first time includes 10 pharmaceutical compounds.

The list includes antibiotic pharmaceuticals such as erythromycin, and nine hormones: 17 alpha-estradiol, 17 beta-estradiol, equilenin, equilin, estriol, estrone, ethinyl estradiol, mestranol, and norethindrone

UV alone, or in combination with selected chemical oxidants has the ability to produce large amounts of the hydroxyl radical (OH-) and ClO-. These species aggressively attack organic compounds, either by the abstraction of hydrogen atoms from water, (alkanes and alcohols), or it can add itself to the compound (olefins and aromatic compounds).

Relative oxidation power of main oxidizing species

Species	Relative Oxidation Power
Chlorine	1.0
Hypochlorous Acid	1.10
Permanganate	1.24
Hydrogen Peroxide	1.31
Ozone	1.52
Atomic oxygen	1.78
Hydroxyl Radical	2.05
Positively charged hole on Titanium Dioxide, TiO_2^+	2.35

The table illustrates how powerful the hydroxyl radical is. It is non selective and initiates a complex cascade of oxidation reactions leading to mineralization of the organic compound.

History

Advanced Oxidation Processes (AOP) can be usefully defined as "near ambient temperature and pressure water treatment processes which involve the generation of hydroxyl radicals in sufficient quantities to effect water purification" [2].

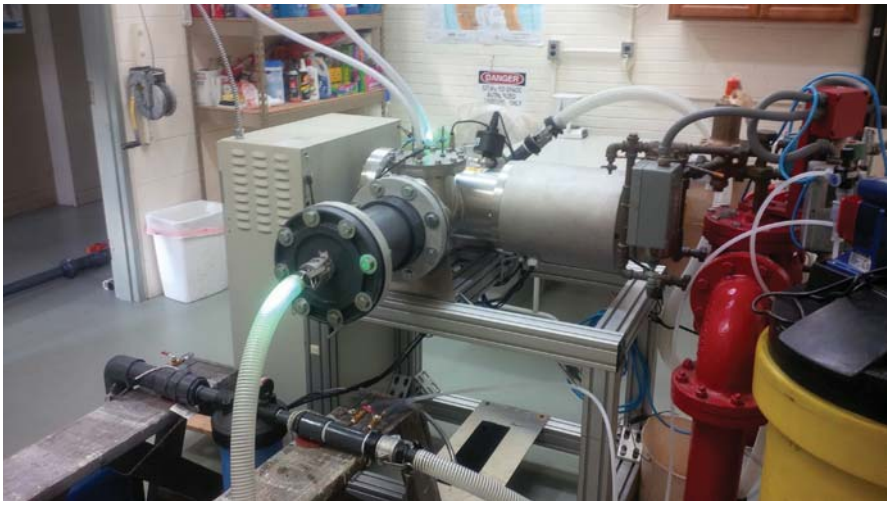
The earliest evidence of this phenomenon was recorded by Downes and Blunt [3], who observed the decomposition of H_20_2 by sunlight in 1879 and the decomposition of H_20_2 by UV, was later observed by Thiele [4] in 1907. By 1922 Kornfeld [5] had developed reaction products from the photolysis of H_20_2 , so the basic concepts of the modern AOP technologies are over 100 years old.

Today these processes are an essential tool in the removal of a number of microconstituent compounds such as NDMA. N-nitrosodimethylamine is a known carcinogen and is effectively removed using UV light. In the USA, California has recently established a public health goal for NDMA, which will likely serve as an eventual regulation in the state. UV light at or close to 228nm is used to photolyzed this compound, effectively breaking the bonds within the molecule.

In the north of Holland, the PWN Water Supply Company successfully replaced breakpoint chlorination at their Andijk drinking water treatment plant by using UV/ H202. The plant wanted to provide control against emerging organisms that are chlorine tolerant, whilst reducing by-product formation and controlling organic contaminants. The effect of UV and H_20_2 on 12 pesticides was studied. For an electric energy of 1 kWh/m^3 conversion varied from 18 % for trichloroacetic acid to 70 % for atrazine. For a combination of $\leq$1 kWh/m^3 and $\leq$15 g/m^3 H2O2 all pesticides could be degraded by more than 80% [6] .

In the UK, operators at the Mid Southern Water drinking water plant at Boxall's Lane used UV light to effectively remove a wide variety of pesticide species from

ETS-UV by Neptune Benson UV systems used as part of AOP pilot study



Picture of ETS AOP pilot system that uses an advanced electrode to generate trace amounts of OH- and ClO- / HOCl in situ from typical levels of TDS in the raw water. The active species are formed immediately upstream of the UV lamps, and effectively consumed during the AOP process.

well water being abstracted from chalk aquifers. Atrazine, Simazine and Diuron in concentrations 0.1μg/l to 0.5μg/l were successfully removed using UV light alone, and a higher removal rate was achieved when UV was combined with of H_20_2.

A 12 month study recently undertaken at Greater Cincinnati Water using validated ETS UV systems examined the ability of a low pressure and medium pressure UV system to reduce 7 contaminants of interest. The study included Atrazine, Metolachlor, MTBE, MIB, Ibuprofen, Gemfibrozil and 17– ethynylestradiol; some of these contaminants have been found in the Ohio River. The study examined the addition of up to 10mg/l of H202 in conjunction with the UV systems, and recorded encouraging degradations under different process conditions. [7]. This facility also compared UV-mediated AOP using Cl2 rather than the conventional H_20_2 , and the improvement in performance, and probably cost savings they measured were striking.

All is not well with H_20_2 based AOP systems

There is a problem using H_20_2 for the AOP chemical input alone, and the high cost of both the peroxide and the necessary quenching chemicals has led to research to understand the powerful role that chlorine plays in AOP processes.

H_20_2 has a low UV absorbance above 220nm, which means that a very large amount of energy is required to produce an effective AOP reaction. The water itself absorbs UV light strongly below 220nm.

Secondly, the reaction rate between the H202 and the OH- radicals is very high. This phenomenon is called scavenging, and results in the majority of the active OH- species not actually reacting with the target (nuisance) compounds.

This explains why in most AOP scenarios, less than 10% of the H202 is actually consumed during the AOP, and additional chemicals a stoichiometric excess of chlorine, Granular Activated Carbon, of Bisulfite are required post the AOP to quench the residual H_20_2.

The use of chlorine in UV-mediated AOP process offers a number of advantages both in terms of performance and operating cost:

The UV absorbance of HOCl is higher than that of H202, *and* the scavenging rate is significantly lower.

Recent studies carried out by Watts et al (2007, 2012) has shown that UV / Cl2 AOP is significantly more cost effective than UV / H202 as an AOP [8].

Work undertaken by Rosenfeldt et al [9] at Greater Cincinnati Water Works , using ETS UV systems by Neptune Benson showed that UV/ Cl2 AOP is capable of reducing MIB by up to 90%, and that this combination out performs UV/H_20_2 at low oxidant concentrations, with significantly less cost by avoiding the need for quenching agents . Interestingly the work showed that no disinfection by-products were formed probably due to the highly reactive nature of the oxidizing species within the AOP environment.

The Science of photolysis

Conventional ozonation or Hydrogen Peroxide oxidation of organic compounds does not completely oxidize many species to CO2 and H2O. In a number of reactions, the intermediate oxidation products can be more toxic than the initial compound. Completion of the oxidation reactions is often achieved using UV light.

Ozone readily absorbs UV light to form OH- from a H_2O_2 intermediate, as shown below:

$$O_3 + hv \longrightarrow O_2 + O(^1D)$$

$$O(^1D) + H_2O \longrightarrow H_2O_2 \longrightarrow 2OH^{\cdot}$$

The absorptivity of H_2O_2 for UV light at 254nm (the wavelength produced by low

pressure, or monochromatic lamps) is very low. It is increased when polychromatic lamps (medium pressure lamps with broader spectral output) are used, and further increased when high quality synthetic quartz is selected with enhanced UV transmittance below 240nm. The process is however still inefficient due to its low absorbance of UV above 220nm.

The direct photolysis of hydrogen peroxide leads to the formation of hydroxyl radicals.

$$H_2O_2 \longrightarrow HO_2^- + H^+ \longrightarrow H_2O_2$$

$$HO_2^- + hv \longrightarrow OH^\cdot + O^-$$

The OH- are scavenged or effectively wasted by reacting with the H_20_2.

These reaction mechanisms are complex, and varied. The illustration below highlights some of the potential breakdown pathways.

The active chlorine species are increasingly seen as a critical component of the AOP process, and looking forward the conventional practice of adding a lot of H_20_2, to then need to quench it with expensive chemicals looks to be obsolete.

A BETTER WAY

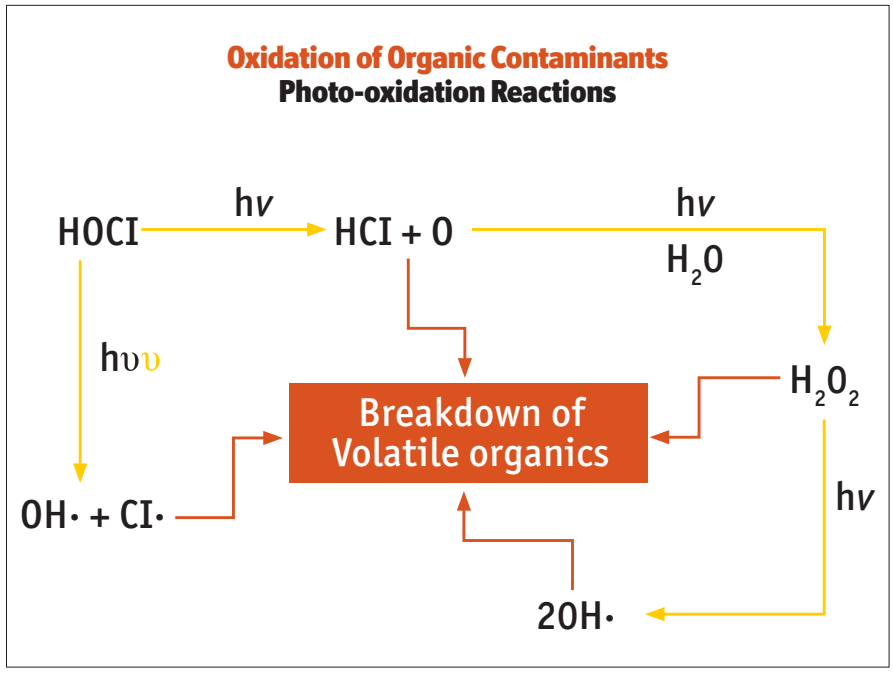
The ETS approach to UV-mediated AOP is to combine an advanced electrode arrangement upstream of the UV lamps into the AOP system. The electrode consists of an anode and a cathode, and is a highly efficient method of converting TDS and other mineral salts found in most ground or surface water into the active chlorine species, and trace amounts of hydroxyl radicals.

The anode and cathode work together to produce trace amounts of $OH^\cdot$ and $ClO^\cdot$ / HOCl (the ration depends on the pH of the water) , which are formed in situ immediately upstream of the UV lamps. The electrodes use a switching power supply to remove any hard water deposits off them. This has the obvious benefit of not requiring the bulk storage of H_20_2 on site, nor does it require the addition of quenching agents due to the inherent inefficiency of the conventional H_20_2 AOP.

Conclusion

UV will continue to play an active role as a disinfection barrier against the chlorine tolerant organisms. As the available water supply dwindles, and we are forced to use and eventually reuse water, so the removal of micro-contaminants, CEC's and PPCP's will become more pressing. Conventional wastewater plants were not built as a barrier to these nuisance compounds so cannot be expected to effectively remove them. Oxidation using UV light and a number of oxidants would seem to be a logical next step.

Hydrogen Peroxide alone probably isn't the answer to AOP process, and UV mediated AOP using chlorine and the active chlorine species offers significant operational and safety benefits [9]. DN



Jon McClean
(jmcclean@neptunebenson.com for questions)
ETS-UV by Neptune Benson

References

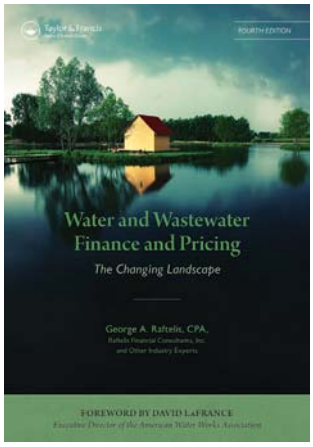
(1) *www.groundwater.org*
(2) Glaze et al Ozone: Sci. Eng., 1987, 9, 335-352
(3) Gmelin (1966) 8th Edition Verlag Chemie , 3, 2275-2285
(4) Gmelin (as previous)
(5) Gmelin (as previous)
(6) Kruithof IOA 1998 p 331-348
(7) Maria Meyer Greater Cincinnati Water WQTC 2009
(8) Watts et al JAWWA 2012
(9) Rosenfeldt et al Journal AWWA July 2013

Electrode assembly being inserted into an ETS AOP system, directly upstream of the UV lamps

Water and Wastewater Finance and Pricing: The Changing Landscape, Fourth Edition

Prepared by: George Raftelis, CPA; Raftelis Financial Consultants, Inc.; and Other Industry Experts

Commentary by: David LaFrance, Executive Director of the American Water Works Association and Ken Kirk, Executive Director of the National Association of Clean Water Agencies



Water and Wastewater Finance and Pricing: The Changing Landscape, Fourth Edition is a financial management guide for utility managers and executives, a compendium of best financial practices for utility financial leaders, a "how-to" guide for rate and finance technicians, and a reference point for policymakers.

Detailing utility financial plans and rate structures, and highlighting how they align with community sustainability goals and utility objectives, is a major focus of the Fourth Edition. Authored and reviewed by numerous financial leaders and executives in the water, wastewater, and stormwater industries, the book tackles complex financial management and pricing challenges confronting these industries. It builds on the concepts used in the standard manuals of the American Water Works Association and the Water Environment Federation, and offers additional insights into financial management and pricing approaches for water, wastewater, and stormwater utilities. Specifically, a major intent of the Fourth Edition is to expand, in a complementary fashion, many of the concepts in these authoritative manuals, and share additional real-world thinking and examples with water, wastewater, and stormwater utilities.

Water and Wastewater Finance and Pricing: The Changing Landscape, Fourth Edition is geared toward professionals assigned to develop water and wastewater financial plans and rates; senior managers with the responsibility for the long-term financial sustainability of the utility; investors and agencies evaluating the financial strength of utilities; engineers/consultants planning water and wastewater facilities; academics teaching financial and pricing principles as a part of public policy curriculum; regulators needing to understand the financial viability of utilities under their purview; and policy makers desiring to support effective financial and rate plans for their constituencies.

Features of Fourth Edition

- Analyzes the processes for developing an effective capital financing plan, including detailed discussions of public sector and private debt, credit facilities, system development charges, interest rates, cost of debt issuance, and market conditions
- Presents all new coverage of water reuse pricing, stormwater pricing, economic and rate structures with wholesale customers, computer modeling of financial systems, risk management, public outreach, and affordability
- Contains case studies of utilities that have adopted effective finance and pricing approaches and systems
- Discusses delivery methods under public-private partnership approaches for designing, constructing, and operating of facilities as well as addressing complex legal, labor, and regulatory issues
- Provides technical and policy insights to utility governing boards

For more information on the book, please visit: *http://www.crcpress.com/product/isbn/9781466577305* or contact George Raftelis at *graftelis@raftelis.com*. DN

Should your facility accept fracking wastewater?

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

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

Nontypical wastewater pollutants

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

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

Regulations for fracking wastewater

States and the U.S. Environmental Protection Agency (EPA) share responsibility for regulating treatment and disposal of wastewater from shale-gas extraction under National Pollutant Discharge Elimination System (NPDES). In October 2011, EPA announced a schedule to develop categorical effluent standards for wastewater discharges produced by natural gas extraction from underground coal-bed and shale formations. EPA will publish the Final 2014 Effluent Guidelines Program Plan after incorporating feedback gathered during the public comment period, which ended November 2014.

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

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

Confirm WRRF's ability to treat wastewater

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

More resources available

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

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

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

Help with ammonia criteria implementation: Tools to be developed for utilities

Utilities seeking help implementing ammonia criteria revised by the U.S. Environmental Protection Agency (EPA) will have several tools resulting from an experts workshop held last fall that discussed how to help reduce the burden for permittees.

The workshop, which took place in Arlington, Va., from October 28 to 29, was hosted by the Water Environment Federation (WEF; Alexandria, Va.), National Association of Clean Water Agencies (NACWA; Washington, D.C.), and Water Environment Research Foundation (WERF; Alexandria, Va.).

EPA published final national recommended water quality criteria for protection of aquatic life from the toxic effects of ammonia in freshwater in 2013. The criteria reflect new data on sensitive freshwater mussels and snails, incorporate scientific views EPA received on its draft 2009 criteria, and supersede EPA's previously recommended 1999 ammonia criteria.

Decision trees for mussels present/absent determinations and related permitting decisions
Role of use attainability analysis and use sub-categorization/tiered aquatic life uses
Possible use water-effects ratio for applying the ammonia criteria
Better definition of mixing zones policies applicable to ammonia
Additional studies on the fate of ammonia in receiving waters
Potential use of in-stream studies to evaluate discharger impacts
Better understanding and definition of the consequences of pH, temperature, and upstream background concentration specifications
Better understanding of the scope of the problem: How many site-specific criteria needed? Is it principally a small plant discharging to small stream and/or arid west problem?
Assess water quality standards attainment options: Adaptive/flexible implementation to make significant, step-wise improvements that may fall short of full attainment
Determine effective implementation timeframe that accounts for complexity of issues, including relationship to triennial review process
Model multi-discharger variance for lagoon and other types of systems (e.g., small package plants) that cannot meet the criteria
Assess applicability of stochastic or probabilistic analysis in permit derivation
Holistic approaches for facilities required to meet both ammonia and nutrient limits – compatibility of treatment options and sequencing of implementation to cost-effectively achieve compliance
Methodology for assessing the benefits of achieving ammonia limits
Public education to promote understanding of the importance of maintaining mussel populations as means of gaining support for funding projects

Table 1. Recommendations from workshop participants

Experts from WEF and NACWA as well as WERF subscribers and state water quality professionals led the workshop. EPA technical staff also provided the agency's perspectives and updates on implementation efforts.

The workshop objectives included the following:

- Identify what tools and projects are needed to fill the information gaps or respond to the flexibility discussed in EPA's guidance.
- Identify data and information gaps needed for implementation of the revised criteria — what details pertaining to implementation in permits and other flexibilities are known now or that will be needed.
- Propose a framework and provide clear guidance for implementation — based on a common set of principles.
- Produce a final report (prepared by WEF, NACWA, and WERF) on the outcome of the workshop to serve as a path to implementation.

Recommendations from the workshop participants are listed in Table 1.

Key elements of the criteria

The 2013 final freshwater aquatic life criteria for ammonia are pH- and temperature-dependent, and expressed as total ammonia nitrogen (TAN). The new criteria more restrictive than the 1999 criteria — see Table 2 for an example.

Criterion	2013	1999
Acute[a]	17 mg/L TAN	24 mg/L TAN
Chronic	1.9 mg/L TAN	4.5 mg/L TAN

Table 2. Freshwater aquatic life criteria (20°C, pH 7 s.u.) aSalmonids present.

The criteria and related materials can be found at *http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/index.cfm* . EPA's key contact for questions related to ammonia criteria derivation and implementation in NPDES permits is Lisa Huff (*huff.lisa@epa.gov*).

In addition, EPA published several factsheets and support documents related to criteria implementation and derivation of site-specific criteria. The most important documents in addition to the criteria publication (EPA 822-R-13-001) are

- *Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria* (EPA 823-R-13-001).
- *Flexibilities for States Applying EPA's Ammonia Criteria Recommendations* (EPA 820-F-13-001).
- *Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for Development of Site-specific Water Quality Criteria for Ammonia* (EPA 800-R-13-003).

The final proceedings for the workshop will be available in mid-February from WEF. WEF, NACWA, and WERF are working with EPA to help implement the recommendations from this workshop. dn

Claudio H. Ternieden *is the director of regulatory affairs at the Water Environment Federation (Alexandria, Va.). He can be reached at* cternieden@wef.org.

Changes the midterm election will bring to U.S. Congresswastewater?

The 2014 midterm election will bring changes large and small, with the biggest change being U.S. Senate control by Republicans, who will appoint new committee chairs and set the legislative agenda. The Senate Committee on Environment and Public Works will now be led by U.S. Senator James Inhofe (R-Okla.). After an 8-year hiatus as chairman while Democrats controlled the Senate, Inhofe has overall seniority on the committee and reclaimed the chairmanship as the committee addresses major regulatory differences the Republicans have with the Obama administration.

In the House, Republicans gained 13 seats, increasing their majority to 242 to 174 over Democrats. Both U.S. Rep. Nick Rahall (D-W.W.) and U.S. Rep. Tim Bishop (D-N.Y.) lost their re-election bids, which vacate the ranking member seats for the House Transportation and Infrastructure Committee and Water Resources & Environment Subcommittee.

U.S. Rep. Peter DeFazio (D-Ore.) is the new ranking member of the committee, and U.S. Rep. Grace Napolitano (D-Calif.) is expected to become the new ranking member of the Water Resource Subcommittee. There were no changes for Republican leadership of the full committee or subcommittee.

Agenda for bills and policies affecting water

Legislatively, Republicans will control the process in both congressional bodies and will likely push forward with several significant water-related bills and policies. WEF Government Affairs believes there will be legislative action to restrict the Obama administration's Waters of the United States (WOTUS) rule, expected to be finalized in Spring 2015.

The annual appropriations bills also will be wholly written by the Republicans. WEF Government Affairs believes these bills likely will reflect the Republican agenda for spending and federal policies, such as possible additional spending cuts to EPA programs and restrictions on implementation of the WOTUS rule and amendments to the Clean Air Act.

Additionally, efforts to move tax reform legislation will likely begin again, which previously have raised concerns over possible changes to tax-exempt municipal bonds. A tax reform bill potentially will include lifting or removing the cap on private capital investments though private activity bonds. DN

Steve Dye *is president of Nexus Government Relations and supports the Water Environment Federation's (Alexandria, Va.) legislative efforts in Washington, D.C.*

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

In Memoriam - Dr. Kenneth D. Kerri

Professor of Civil Engineering, Pioneer in the Field of Wastewater Management, and Founder of the Office of Water Programs

The Department of Civil Engineering is sharing this obituary with the Office of Water Programs at the request of the Kerri family.

Kenneth Donald Kerri, Ph.D., age 80, passed away suddenly after a brief illness with his beloved family at his side. He is survived by his loving wife Judy, son Chris (Anne), daughter Kathy Krizl (Norman), two grandchildren, Justin and Sarah Kerri, brother Richard Kerri, and devoted dog Angel.

Ken Kerri was born April 25, 1934, in Napa, California. He graduated from Napa High School in 1952, attended Napa College, and Oregon State College (BSCE, 1956); University of California, Berkeley (MS in Sanitary Engineering, 1958); and Oregon State University (Ph.D., Sanitary Engineering, 1965).

He started working as a professor teaching civil and sanitary engineering classes at Sac State in 1959. He became an emeritus professor in 1997. During his teaching career Ken mentored hundreds of civil engineering students and received several awards, including the Distinguished Faculty Award.

In 1968, he started working on operator training programs, establishing the CSUS Office of Water Programs in 1972. He served as the Project Director for projects that developed and implemented training programs for the operators of water

treatment facilities, water distribution systems, wastewater collection systems, municipal and industrial wastewater treatment and reclamation facilities, pretreatment facility inspection, and utility management. In 2005, over 1 million operator training manuals had been sold and more than 250,000 operators from all over the world had enrolled in the training programs. The manuals have been adopted as textbooks in over 300 colleges and universities and have been translated into 12 different languages. The operator training programs provided Ken and Judy the opportunity to travel all over the world. Most recently, he was the senior advisor on a project to train and license operators of water and wastewater plants for the country of Jordan; this project has been expanded throughout the Middle East.

As a professional consulting engineer he provided professional consulting services for cities, counties, special districts, states, federal government, universities, industries, and consulting engineering firms. Throughout his career he received many awards, including the top honors by the Water Environment Federation and the American Water Works Association. He enjoyed hunting, fishing, skiing, walking his dog by the American River, hiking, playing bridge, and spending time with his wife, children, their spouses, and grandchildren.

A memorial service was held on Saturday, December 27, 2014, at 11:00 a.m. at Fremont Presbyterian Church, 5770 Carlson Drive, Sacramento, CA 95819.

In lieu of flowers, the Kerri family requested that donations be made to the Ken Kerri Endowment Fund, which was established in 2009 to build a foundation for the education of future engineers: *http://www.ecs.csus.edu/ce/support.html*.

Checks may be sent to:
Department of Civil Engineering
Attention: Ms. Neysa Bush
California State University, Sacramento
6000 J Street
Sacramento, CA 95819-6029 DN

Coming together to benefit all

Lonn L. Rasmussen
lonn@cid.utah.gov

Competition for limited budget dollars is always on going, we are all trying to do more for less. One way I propose we can save everyone money is to set up and utilize State Purchasing Contracts. At the Association of Special Districts meeting in November, I talked to Vanessa Baldwin and Nancy Orton, who are with the State Purchasing Department.

Our discussion centered on creating cooperative purchasing contracts for commonly used goods and services that every entity can utilize. If we work with the State Purchasing Department we can get a better price for commonly used goods and services than if each of us goes out to the open market to buy them.

As an example for Collection Systems, Truck Chassis, Pipe, Pipe Rehabilitation and Root Control are some of the common services used in the industry that can be put under a Cooperative Purchasing Contract. I'm sure you are thinking right now of other goods and services that can also be under a purchasing contract for Collections, Wastewater Treatment, Water Treatment and Water Distribution.

I would like to invite all interested parties to meet and explore the possibilities of coming together with State Purchasing to create Contracts we can all use to our mutual benefit. Please let me know if you are interested. DN

QUIZ

What you should know about PPE!

1. What percentage of accidents were caused by an unsafe act rather than an unsafe condition?
   a. 52% b. 68% c. 75% d. 90%

2. Ground Fault Circuit Interrupters (GFCI) must used in which of the following?
   a. Temporary power circuit's
   b. When conditions are wet
   c. Portable generators over 5,000 watts
   d. All of the above

3. When can guards be removed from equipment?
   a. When proper PPE is worn
   b. When jammed
   c. After it's locked and tagged out
   d. All of the above

4. PPE is an acronym for?
   a. Prevention of Possible Electrocution
   b. Personal Protective Equipment
   c. Prescribed Predicament Education
   d. Protection from Personal Emergencies

5. Air detectors should be zeroed when and where?
   a. Before being used, in the manhole
   b. Before being pulled from the charger, back of the truck
   c. After being used to set up for the next time, in good clean air
   d. Before testing the manhole, in good clean air

6. What type of glove should be worn when handling a continuous rodder?
   a. Leather b. Rubber
   c. Latex d. Nitrile

7. What type of glove will protect you from disease causing organisms?
   a. Leather b. Vinyl
   c. Nitrile d. Cotton

8. Where can a person go to find out what protective equipment to use when working with a chemical?
   a. OSHA
   b. SDS formerly MSDS
   c. MEK Index
   d. Chem Safe

9. The most common route of exposure for most health hazards is?
   a. Inhalation b. Skin absorption
   c. Ingestion d. Mucus membrane

10. Who has the most affect on improving safety?
    a. Supervisor b. Employees
    c. UOSHA d. Work partner

Operations (Challenge) Quiz

By Gordon Evans

You are operating an activated sludge Bio-Reactor process treatment plant. Your facility has dual (2) process trains each containing; (1) Anaerobic Zone with 0.55 MG volume. (1) Anoxic Zone with 0.55 MG volume. (3) Aerobic Zones with 0.74 MG each. The plant is currently seeing an Influent flow of 6.5 MGD with a BOD of 357 mg/L. Process train 1 has a MLSS concentration of 3175 mg/L with a volatile content of 78%. Process train 2 has a MLSS concentration of 2721 mg/L with a volatile content of 76.4%. Wasting at your facility is done to a target mg/L of 2800. The wasting is calculated in total lbs. to be wasted per day.

1. Calculate the total lbs. to waste from the plant each day. (Assume 7 day a week wasting)
   a. 8196 lbs. b. 2049 lbs.
   c. 4098 lbs. d. 4099 lbs.

2. There is an imbalance of solids between the two process trains and solids are increasing in train 1. Assuming that the influent flows are evenly split, what is the amount in lbs. that must be wasted from train 1?
   a. 1762 lbs. b. 2336 lbs.
   c. 3524 lbs. d. 4672 lbs.

3. What is the amount in lbs. that must be wasted from train 2?
   a. 1762 lbs. b. 2336 lbs.
   c. 3524 lbs. d. 4672 lbs.

4. What is the difference in lbs to be wasted between train 1 and train 2?
   a. 1762 lbs. b. 2336 lbs.
   c. 3524 lbs. d. 4672 lbs.

5. Your facility has a target F/M of 0.2. What steps must you take to get to the target F/M?
   a. Increase the target wasting lbs.
   b. Decrease the target wasting lbs.
   c. Increase influent BOD
   d. Both A and C.

Answers: What you should know about PPE!

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

Answers: Operations (Challenge) Quiz *on next page*

QUIZ

Answers: Operations (Challenge) Quiz

1. First calculate the total volume of the two ditches. [0.55 + 0.55 + (0.74 X 3)] X 2 = 6.64MG
   - Find the average MLSS of the process basins. (3175mg/L + 2721mg/L) ÷ 2 = 2948mg/L
   - Calculate the total lbs. in the system. 6.64 MG X 2948 mg/L X 8.34 lbs. /gal = 163253 lbs.
   - Calculate the target lbs. 6.64 MG X 2800 mg/L X 8.34 lbs/gal = 155057 lbs.
   - Find the difference in lbs. between the target and the actual lbs. 163253 lbs. - 155057 lbs. = 8196 lbs. (A)

2. Find the % difference between process basin 1 and 2. 2721 mg/L ÷ 3176 mg/L = 85.6%
   - Subtract 85.6% from 100% to get the multiplier. 100% - 85.6% = 14% or .14
   - Divide the total lbs. to waste by 2 and multiply that by the % difference. 10190 lbs. ÷ 2 = 4098 lbs.
   - 4098 lbs. X .14 = 574 lbs.
   - Add 573 lbs. to 4098 lbs. 574 lbs. + 4098 lbs. = 4672 lbs. (D) this is the lbs. to waste from train 1.

3. Subtract 4672 lbs. from the total of 8196 lbs.
   - 8196 lbs. - 4672lbs. = 3524lbs. (C) this is the lbs. to waste from train 2.

4. Subtract 4382 lbs. form the total 8196 lbs. to get the difference between the two trains. 8196 lbs. - 3524 lbs. = 4672 lbs. (D)

5. F/M = lbs. food ÷lbs. bugs. First calculate the lbs. of food. (It is not necessary to use 8.34 lbs/gal in this Calculation).

6.5 MGD X 357 mg/L BOD = 2321
   - Find the volatile content of the MLSS. 3175 mg/L X 78% = 2477 mg/L
     2721 mg/L X 76.4% = 2079 mg/L
   - Find the average. (2477 mg/L + 2079 mg/L) ÷ 2 = 2278 mg/L
   - Multiply the basin volume by MLVSS 6.64MG X 2278 mg/L = 15126
   - Divide the BOD by the MLVSS 2321 ÷ 15126 = 0.15
   - Divide the BOD by the target F/M 2321 ÷ 0.20 = 11605 mg/L this is the new target MLVSS.
   - To increase F/M decrease the microorganisms. Do this by increasing the target lbs. to waste. (A)

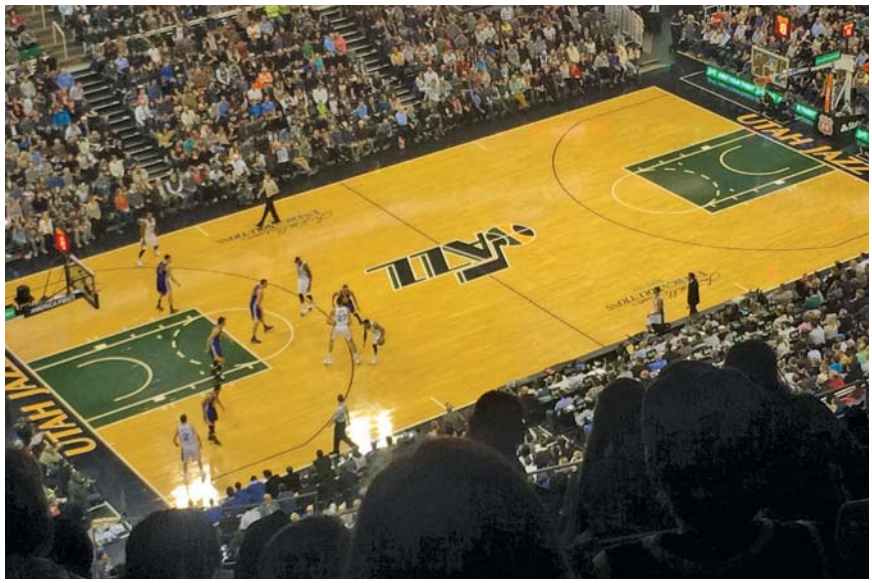
YPs attend Utah Jazz game

WEAU members and their families enjoyed a fun night at the Utah Jazz game on Friday January 30th. Approximately 60 people attended. All enjoyed a buffet style dinner, a delicious dessert and snacks at half time. This was a great opportunity for WEAU members to socialize with each other and enjoy time with their families. The Utah Jazz defeated the Golden State Warriors in a very exciting game with a final score of 110 to 100.

Thank you to the Young Professionals Committee for organizing this wonderful event!

Make sure to hear about future WEAU events, by signing up to be on the email list: send an email to *membership@weau.org*.

Also, please sign up to be on the WEAU Young Professionals and Students Group email list: sign up using the form at: *http://www.weau.org/who-we-are/young-professionals*. DN



Digested News would not be possible without the advertising support of these companies and organizations. Please think of them when you require a product or service. We have endeavoured to make it easier for you to contact these suppliers by including their telephone number and, where applicable, their websites.

Company	Page Number	Telephone	Website
Ambiente H2O	24	801-532-4812	www.ambienteh2o.com
Aqua Engineering	20	801-299-1327	www.aquaeng.com
Biolynceus Biological Solutions	35	970-586-3391	www.biolynceus.com
Bowen Collins & Associates, Inc.	34	801-495-2224	www.bowencollins.com
Brown and Caldwell	23	801-316-9800	www.brownandcaldwell.com
Carollo Engineers	10	800-523-5826	www.carollo.com
CH2M HILL	29	801-350-5200	www.ch2m.com
Coombs-Hopkins	21	801-990-3174	www.coombshopkins.com
DEWCO, Inc.	40	303-232-6861	www.dewco.com
DN Tanks	10	714-767-1313	www.dntanks.com
E C Power Systems	27	801-886-1424	www.ecpower.com
EJ	9	303-286-8014	www.ejco.com
Empire West, Inc.	26	801-812-2818	www.empire-west.com
Environmental Dynamics International	2	573-474-9456	www.wastewater.com
Flow Control Equipment	29	801-571-0304	flowcontrolequipment@hotmail.com
Forsgren Associates, Inc.	30	801-364-4785	www.forsgren.com
Goble Sampson Associates	7	801-268-8790	www.goblesampson.con
HACH Company	3	800-227-4224	www.hach.com
Hansen, Allen & Luce	10	801-566-5599	www.hansenallenluce.com
Hydro International	7	866-615-8130	www.hydro-int.com
isiWEST	17	801-718-6518	www.isiWEST.com
LaTech Equipment & Controls	43	800-801-3982	www.latechequipment.com
Medora Corporation (SolarBee and GridBee brands)	5	866-437-8076	www.medoraco.com
MWH Americas, Inc.	37	801-617-3200	www.mwhglobal.com
Pipeline Inspection Services, Inc.	21	208-465-3444	www.pipelineinspectionservices.com
Pittsburg Tank & Tower Maintenance Co.	16	270-826-9000	www.watertank.com
Pollardwater	44	800-437-1146	www.pollardwater.com
Smith & Loveless Inc.	18	800-898-9122	www.smithandloveless.com
SpectraShield Liner Systems	10	800-422-7266	www.spectrashield.com
Sunrise Engineering Inc.	6	801-523-0100	www.sunrise-eng.com
Tideflex Technologies (ICS Sales Inc.)	8	412-279-0044	www.redvalve.com
Twin "D" Environmental Services	19	801-771-3038	www.twind.net
Val Kotter & Son's	16	435-734-9598	www.valkotterandsons.com
Wheeler Machinery Co.	15	801-974-0511	www.wheelercat.com

To reach Utah's water industry professionals through the *Digested News* magazine and its targeted readership, contact Kris at your earliest convenience to discuss your company's promotional plans.

Kris Fillion, *Marketing Manager*
Phone: 866-985-9798 Fax: 866-985-9799 E-mail: kfillion@kelman.ca

Make the most of your remote assets with complete end-to-end solutions for monitoring and controlling field operations across a widely dispersed infrastructure

Controlling cost of ownership

The installation, operation and maintenance of remote site SCADA operations is often the most significant overall long term expense factor. With scalability,flexibility and ease-of-use in mind, Schneider Electric's Telemetry and Remote SCADA Solutions are tailored to help lower this total cost of ownership.

Secure and Reliable SCADA

Safety and availability are must-have characteristics of critical infrastructure. This especially holds true when considering security for SCADA systems that monitor and control remote operations across a wide array of communications technologies. At Schneider Electric, our Telemetry and Remote SCADA Solutions incorporate solid security at all levels, from the field to the enterprise.

Minimizing risk by improving safety and regulatory compliance

Many industries are challenged with increasing requirements for operational safety, compliance with environmental regulations and the overall security of assets. Schneider Electric's Telemetry and Remote SCADA Solutions address all of these critical requirements through flexible end-to-end integration and comprehensive feature sets.

Visit **www.schneider-electric.com/us**

Innovation at work

SCADA Expert ClearSCADA software – Providing functions to reliably and securely manage remote SCADA assets across a wide range of communication options, with easy integration into business systems.

Trio Data Radios – Ensuring data integrity over short and long-haul distances with versatile and reliable data transmission options.

SCADAPack Smart RTUs -The monitoring and communication capabilities of a Remote Terminal Unit (RTU) combined with the processing and data-logging power of a Programmable Logic Controller (PLC).

Accutech Wireless Instrumentation – Configurable startup and failsafe conditions, enhanced diagnostics and years of maintenance free operation.

Make the most of your energy℠

LaTech Equipment & Controls

As Represented by **LaTech Equipment & Controls**
UTAH • MONTANA • WYOMING • IDAHO • NEVADA
Contact: (801) 886-1145 Toll free (800) 801-3982
info@latechequipment.com www.latechequipment.com

Schneider Electric

Pollardwater™

CHEMICAL FEED EXPERTISE

Blue-White Industries, Ltd.

LMI

PULSAFEEDER®

STENNER PUMPS

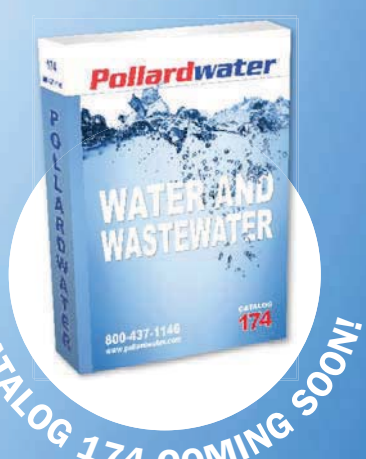
WALCHEM

CHEM-TECH

Put our Chemical Feed experts to work for you. We offer competitive pricing and fast shipping anywhere in the world.

Pollardwater is your source for Chemical Feed!

Call Nick at x171 for Tech Support and Free Shipping on Chemical Feed Pumps



800-437-1146 • www.pollardwater.com