

WINTER
2013

The Official Publication of the Water Environment Association of Utah



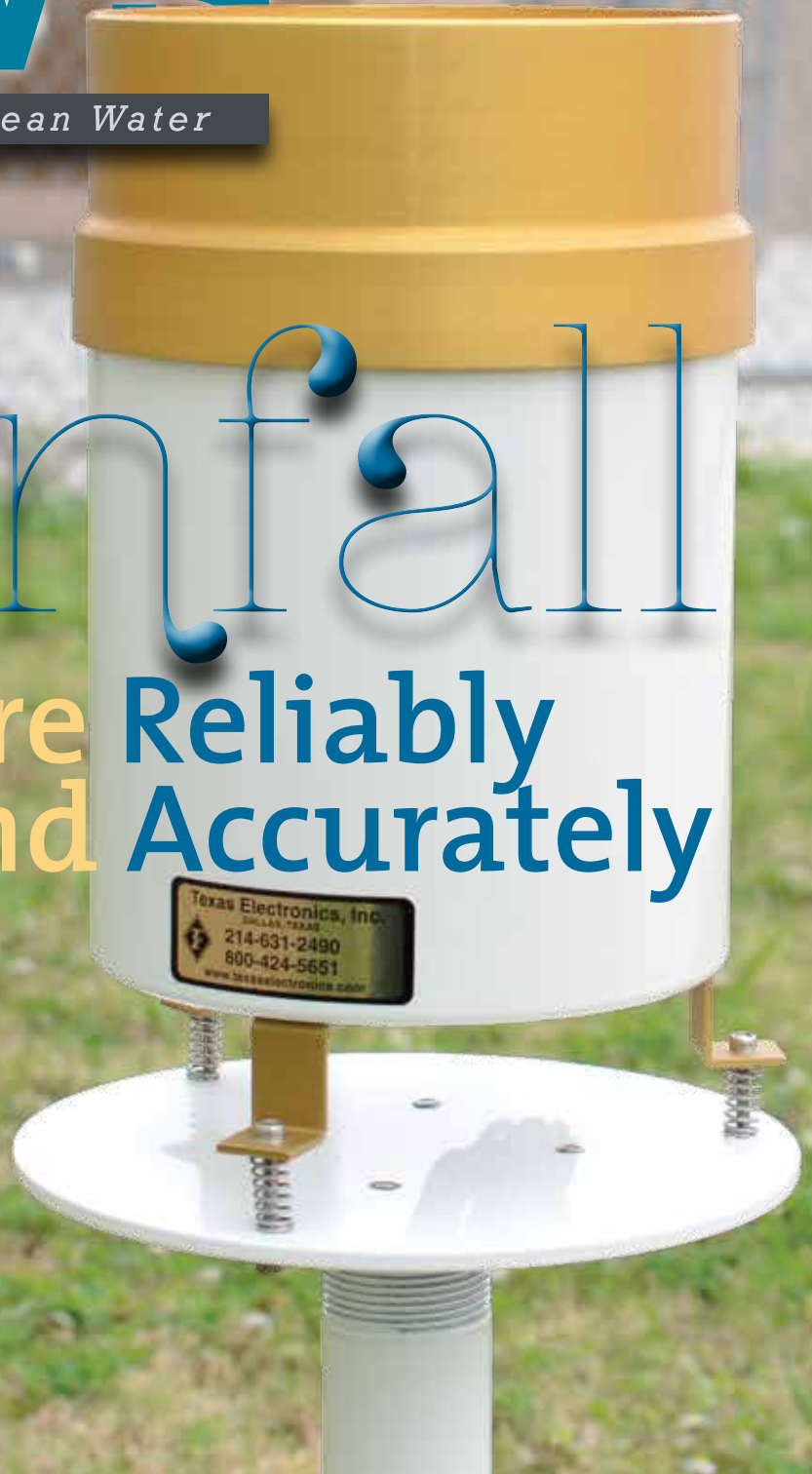
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2014 Buyers' Guide ■ Lagoon Upgrade ■ WEFTEC Review

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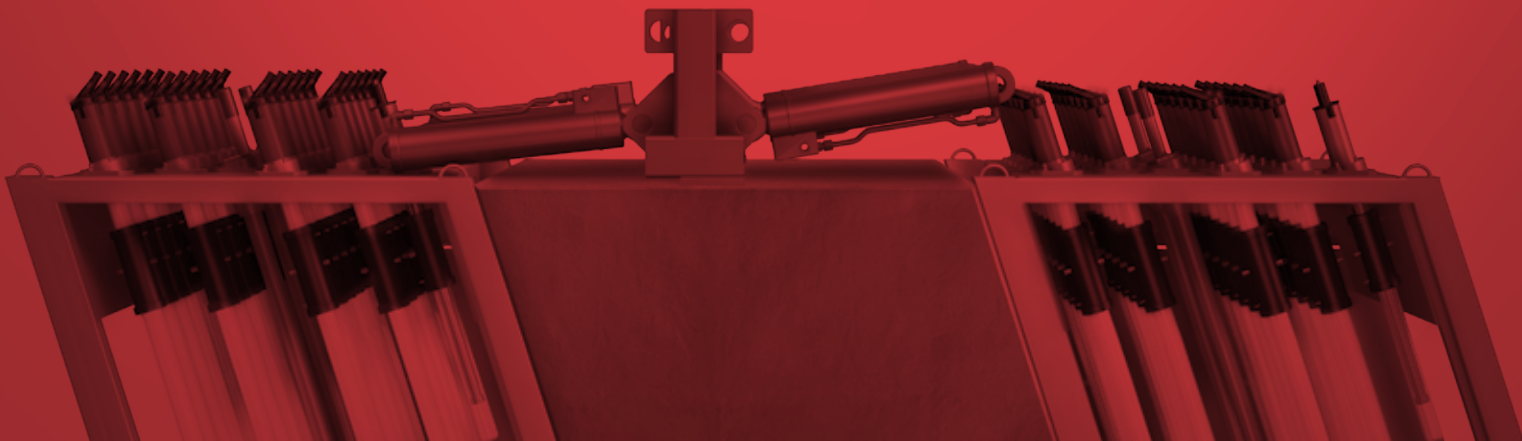


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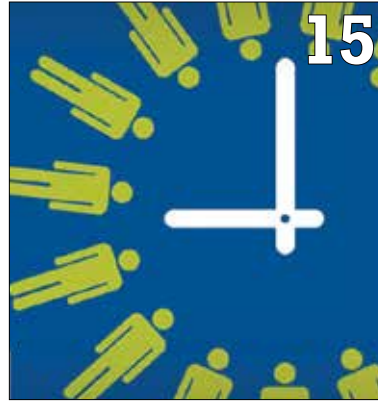
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FEATURES

2013 WEAU Mid-year Conference Recap..... **12**
 WEFTEC Review **14**
 Be The Match..... **15**
 Gauging Rainfall More Reliably and Accurately **16**
 Lagoon Upgrade..... **19**
 Facing the Future **23**
 2014 WEAU Buyers' Guide..... **28**

Departments

President's message **6** Students and Young Professionals **33**
 Editor's message **8** Advertisers' index **38**
 Collections **10**

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Honoring the symbol of Nelson Mandela via professional meritocracy



Dru Whitlock

Nelson Mandela's death has resulted in many of our world leaders, including President Obama, to recognize a man who symbolizes equality, freedom, and

democracy. As I read through many of the articles about Nelson Mandela, I learned he was not perfect, yet as the leader of the anti-apartheid movement in South Africa he

suffered in prison for decades and fearlessly fought for freedom and liberty, achieving what few others have. For the vast majority of us in North America, we do not think about freedom frequently, because we have it. We enjoy a free and a democratic society. As has been said before, one does not truly appreciate freedom or good health, for example, until it is lost.

Yet as we in United States live in a free society, there are subtle, yet potent, biases that negatively affect society. Getting to the message to WEAU in remembrance of this great man, Nelson Mandela, and the endemic cultural discrimination of races and gender in our own country, I contend that we must strive to attain a meritocracy. Meritocracy is defined as a political philosophy that holds power should be vested in individuals (or organizations) according to merit. Advancement in such a system is based on talent, diligence, knowledge, focus, etc measured through examination and/or demonstrated achievement in the field where it is implemented.

Indeed, we are continually judging our peers in our profession (as much as we hate to admit it), and as humans we have our own biases and predispositions, but we must strive for fairness and objectivity. We must continually examine our own evaluation systems for hiring of employees, selection of equipment, materials and processes, selection of contracting firms, etc., to ensure our decision systems attain transparency and can withstand a highly scrutinized audit. This is not a onetime effort, but rather a continual process for better systems and improvement.

Let us recognize this great man, Nelson Mandela, and respect him by continuing to make improvements in our own personal interactions and organizational culture to attain a meritocracy. By striving toward a meritocracy, we will reward individuals and organizations based on talent, hard-work, innovation, diligence, and achievement. I know our profession will benefit from it. **DN**

Dru Whitlock
President

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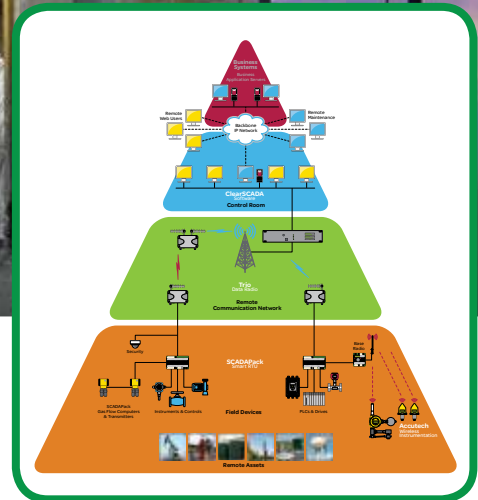
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Tips for winter

Chad Burrell

I feel that winter came on me too quickly this year. Thanksgiving Day was a beautiful sun shining day that did not even require a jacket. The following week I found myself pushing a foot of snow off my driveway, that same day I

ended up at work with six inches of snow and ice on my car, and no scraper to clean the windshield, I think my kids rob them out of the cars to play with them, and of course they never get put back in the car. My thoughts turn to preparedness at

times like this; especially since there were so many things I wanted to get done this year before they were covered with snow. I came up with some things that can be done in the workplace or at home to help prepare us better for this time of year.

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Aaron Spackman, Project Manager, Hughes General Contractors

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- Check antifreeze in radiators to make sure it is rated for cold weather, this includes equipment ranging from cars and trucks but don't forget the loaders, trailer-mounted pumps, or snow plows. If equipment has engine block heaters it helps if they are plugged in on cold nights, this could even be done on a timer so that it only heats when needed. There are also many varieties of fuel additives that can be put in the tank for cold weather starting and operation.
- It is a good idea for employers to have on hand blankets, food, and water somewhere at your facility. This could be dried food or MRE's and something as simple as a pallet of bottled water. In the event we get snowed in the last thing we may want to be doing is spending the night with our co-workers at work, but it might be more tolerable if we at least are warm and have something to eat.
- Work vehicles should be stocked with first aid kits and it does not hurt to take that a step further and have a 72-hour kit, blankets, and water especially in our personal vehicles. From experience I have found that jumper cables and a towrope come in handy as well.
- Have ice-melt and snow shovels on hand, our tailbones will thank us and so will the workman's comp people. Check as well to see if there are any hoses, piping, or hydrants that would benefit from some heat tape.
- KEEP AN ICE SCRAPER IN YOUR CAR AT ALL TIMES!!!

Hopefully the tips help and you enjoy this time of year. [DN](#)



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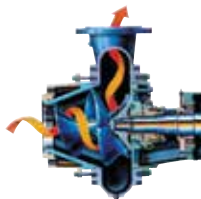
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 - 50', 100', 200'
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Answers:

1-C, 2-low beam, high beam, left turn, right turn, four way and clearance, 3-D, 4-Fire extinguisher and fuses 5-A, 6-B, 7-B, 8-False, mirrors on the doors are side view mirrors, 9-D, 10-B

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WEAU 2013 Midyear Conference

- A continuing success story

by Jim Schwing, P.E., CH2M HILL

The Midyear Conference continued its legacy of success with a headcount. The Midyear Conference continues to be popular because of the great program, the centralized location and the one day duration. Attendees came from as far away as Logan and the Orem/Provo area. The fact that attendees can attend so many quality presentations all packed into one day is also a major draw.

There were 24 technical presentations and operator training session. The technical presentations covered all aspects of wastewater management including water quality, wastewater collection and treatment, and biosolids management. The operator training sessions covered wastewater math, field operations and safety. The Young Professionals sponsored a student poster contest with a \$500 award, a coat drive for the Road Home and


they held a dinner afterwards at the local Sizzler Steak House for their members and senior industry representatives.

The luncheon program was packed full of recognitions of students and operators for their accomplishments led by WEAU President, Dru Whitlock of CH2M HILL, and culminating with a presentation on Alan Matheson, Governor Gary Herbert's Senior Environmental Advisor. Student recognitions included the Midyear Conference Poster Contest winner, Mitch Hogsett of the University of Utah and the WEAU Robert W. Okey Scholarship for Graduate and Undergraduate students at local colleges and universities. Both \$3,000 scholarship winners this year are from Utah State University with Daniel Ryan at the undergraduate level and Morris Dimitry at the graduate level.

The Wasatch All Stars were recognized

for taking 9th Place overall. Wasatch All Stars included Jonathan Gubler, Hadley Gunn, Clay Marriott, Dustin Lewis, and Dave Smilanich. The North Davis Royal Blues team won 6th place in the overall competition and that team's members were Gordon Call, Tyler Barfuss, Tom Anderson, Jason Stansfield, and Bryce Southworth.

The Midyear Conference Committee members responsible for the ongoing success of this conference include Tom Holstrom/CVWRF, Facilities; Trevor Lindley/JUB, Technical Programs Lead; John Marteliz/CID and Brett Olson/CWSID, Operator Program; Ruby Diaz and Patty Eagler/MWH, Promotions; Tiffini Adams/CVWRF, Registration; David Hatch/Brown and Caldwell, Young Professional; Matt Myers/SDSD Board Liaison; and Jim Schwing/CH2M HILL, Chairman.

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“The Midyear Conference continues to be popular because of the great program, the centralized location and the one day duration.”



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I was fortunate enough to attend WEFTEC in Chicago this year and let me tell you, it was an amazing experience. From just the sheer size of the exhibitors' floor down to the Operations Challenge event, WEFTEC 2013 was a success. I still cannot get over how massive WEFTEC was. For example, they hung up banners with numbers on them at every row for people like me who get lost easily. Too bad it did not help me because I still ended up getting lost. I would suggest next year that they put pictures up instead of numbers for simple-minded people like me. We had a lot of WEAU members attend WEFTEC this year. There were two Operations Challenge teams who competed, the Wasatch Allstars and the North Davis Royal Blue. This was the first year we had people from our association help out with judging and resetting the Operations Challenge events. Marlo Davis had the privilege of being a head judge over the safety event. Too bad both Utah teams did not run their safety event on his platform, because we would have taken home first and second place finishes in that event, right Marlo? That is just wishful thinking from me. Marlo is a terrific judge and did a wonderful job representing WEAU. The Wasatch Allstars and the North Davis Royal Blue teams also represented WEAU and their entities well. Both teams were very competitive in every event as shown by their placement. North Davis Royal Blue finished 6th overall out of 40 teams and won best uniform. The Wasatch Allstars finished 9th overall out of 40 teams and had a 2nd place finish in the maintenance event. Congratulations to both teams on a great job. It was nice to see all the support from managers and board members while our challenge teams were competing. By far, we have the best support at Nationals over any other member association. The thing I will take away from this the most is how Brett Olson conquered his fear of public speaking. He seemed like a seasoned vet up there on the podium. I, on the other hand, was shaking like a leaf in the wind. Brett threw me under the bus and we had to give a presentation at WEFMAX with Clint Rogers and Lance Wood. The presentation was a huge success and generated a lot of interest about our member association and the success we have had with our Operations Challenge teams.

I would like to thank the WEAU board, the entities, the managers, and everyone who participated in the Operations Challenge this year. Thanks again and we will see you all soon. **DA**

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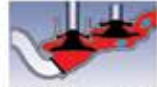


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Rain gauges are critical tools for those charged with studying or monitoring everything from irrigation run-off, erosion, and flood control to water resources and environmental watershed sustainability.

With so much riding on the accuracy and reliability of liquid precipitation data in various locations and microclimates within a region, the quality of construction, the placement and even the ability withstand years of harsh weather conditions all factor into the integrity of the information collected.

Fortunately, improvements in rain gauge design are delivering research-grade results to professionals across a range of water-related disciplines.

Increasing Data Accuracy

Many factors contribute to the accuracy and reliability of rain gauges.

To start, there is the quality of the device itself. Rain gauges come in many different styles, including standard graduated cylinder, weighing, and tipping bucket gauges.

Although most are of relatively simple concept and design, the quality of construction and materials has a tremendous impact on accuracy.

Rain gauges sold in big box stores are typically constructed primarily of plastic, while industrial-grade rain gauges are constructed of more durable materials, such as aluminum exteriors that are anodized and powder coated. The difference can be as significant as a rain gauge that produces years of reliable, accurate data versus one that swiftly degrades and proves unreliable in the field.

Rain Gauges Options

Standard rain gauges consist of a funnel that empties into a graduated cylinder inside a larger container designed to catch overflow. This type of gauge requires in person monitoring and measurement and does not indicate the "character" of the rainfall (light, medium, or hard) over time.

Weighing style gauges involve a storage bin that is constantly weighed and the results recorded. The advantage of this type of gauge is it can measure other forms of precipitation, including



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hail and snow. Although quite accurate, these gauges are much more expensive and require frequent maintenance.

Perhaps the most popular rain gauge in the industry today is the tipping bucket style. The tipping bucket utilizes a funnel to direct rainfall to a seesaw-like bucket that tips and empties when it is full. With each tip of the bucket, an attached magnet actuates a sensor switch. Connecting the sensor to an electronic data logger event counter or existing data acquisition system enables automated recording of accumulated rainfall. Such devices require little to no attention, or servicing.

Tipping bucket style rain gauges, however, have a few inherent design limitations that can impact accuracy under more extreme weather conditions.

Fortunately, manufacturers of industrial-grade rain gauges like Dallas-based Texas Electronics, a pioneer and innovator in the field of quality meteorological instrumentation since 1956, have preserved the advantages of the tipping bucket style rain gauge while addressing some of its inherent design issues.

The company offers a variety of rain gauges and accessories, along with instruments that measure wind speed, wind direction, temperature, barometric pressure, humidity, rainfall and even solar radiation. Complete weather stations that cover the gamut are also available.

Most of the design improvements from Texas Electronics center on the collection device and are intended to improve its ability to capture each droplet of rain possible, even under extreme conditions such as extremely heavy winds and intense rainfall.

For this, improvements that increase tipping bucket accuracy include an ultra-sharp lip edge designed for better capture and to eliminate high winds from blowing rain off the funnel edges, a deeper collector to prevent rain from splashing out during high wind conditions and heavy rainfall from overflowing, and an optional siphoning system that regulates the flow rate into the tipping bucket to minimize error caused by high rainfall intensities.

Rain gauge accessories available from just about any rain gauge manufacturer can also assist in improving accuracy. When temperatures drop close to, or below, freezing then snow or ice may accumulate and block rainfall from entering the device. A tipping bucket with a heater element can melt away any blockage to allow for accurate measurements.

The Value of High Quality Gauges

For Mike Liquori of Sound Watershed in Northern California, measuring rain accurately is vital to his work.

“Sound Watershed works with a variety of organizations and authorities on different applications, many of which depend in some way on rain gauges.” Liquori stated.

According to Liquori, flood control, excessive erosion, stream restoration, sustainable land use projects, urban development, agricultural business and forestry protection all fall within the purview of his company.

Liquori emphasizes the importance of having numerous, high quality instruments. “We have over 70 tipping bucket style rain gauges from Texas Electronics actively in use throughout a wide range of settings: dense urban environments, sub-urban and semi rural landscapes, and industrial wetlands.”

In Liquori’s realm, conditions can quickly become dangerous without accurate information. In a dense urban environment, major storm water run-off from a multitude of rooftops and parking lots can quickly lead to floods.

“When it rains, we monitor storm run-off very closely,” explains Liquori. “Situations in cities here can quickly elevate to flood warnings and critical time for response makes dependable rain gauges a



high priority. Our ability to assess rapidly changing situations where storm water runoff occurs is important for safety and environmental reasons.”

Strategic Placement

Another factor that plays a role in accuracy is one of placement. To obtain the most reliable measurements and accommodate variances in weather patterns in locations even a few miles apart, rain gauges are often installed in tight grids to assure the accuracy of the information gathered.

“It may be raining one tenth of an inch in one area and just a mile away a storm cell is dropping five inches,” says Layne Marlow, Field Technician at the South Plains Underwater Conservation District Marlow. “Knowing this information on such a small territorial basis is very important in a region like this in Texas.”

Marlow tends to 33 Texas Electronics rain gauges spread out over 902 square miles of the Southern High Plains of Texas. About 450,000 acres are under cultivation across this rich farmland, with 150,000 acres irrigated using groundwater. Rain gauges are vital in determining the rate of groundwater recharge.

The Edwards Aquifer Authority in San Antonio provides another example of groundwater monitoring. The Edwards Aquifer Authority regulates an area about 180 miles long and anywhere from 5 to 40 miles wide for a total of 3,600 square miles.


As the Senior Hydro-geologist and Aquifer Science expert, Dr. Marcus Gary’s primary mission is to maintain investigative studies to quantify how the Edwards Aquifer recharges and discharges in this semi-arid region of Texas.

Naturally, rain gauges comprise a major part of that ongoing work. Although there are other divisions within the aquifer authority that use various brands, the ten rain gauges Dr. Gary utilizes are from Texas Electronics.

In addition, Dr. Gary has utilized rain gauges for the unique purpose of measuring moisture from cave ceilings.

“Aquifers like ours feature sinkholes and caves,” says Dr. Gary. “In some large limestone caves, we have specially modified rain gauges to measure the moisture that drips from the cave ceiling. Everything is important in managing groundwater, even micro-amounts of rainfall contribute to recharge and are important.”

For more information contact Texas Electronics, Inc.; 5529 Redfield Street; Dallas, TX 75235; 800-424-5651; (214) 631-2490; (214) 631-4218 Fax; info@texaselectronics.com;

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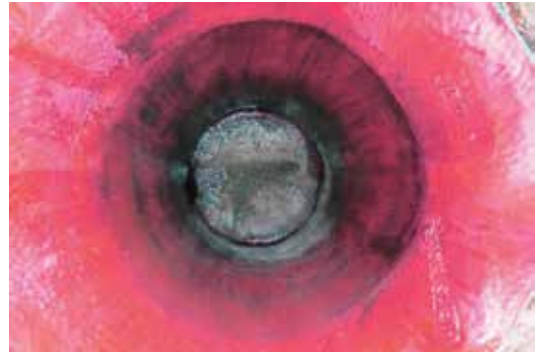


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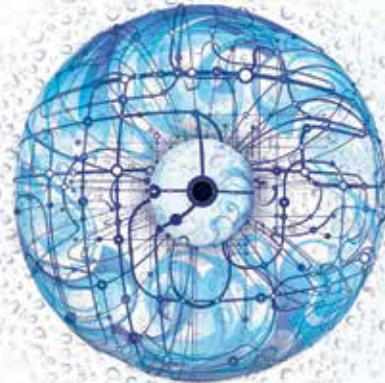
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Lagoon upgrade meets ammonia limits

By Kevin Vieira and Merle Kroeker, Nelson Environmental
(reprinted with permission from the Winter 2013, Western Canada Water magazine)

The City of Walker is located in Linn County, Iowa. The City's wastewater treatment facility consisted of a two-cell, non-aerated, controlled discharge lagoon. The lagoons were permitted to discharge every 180 days during the spring and fall. However, the plant had reached maximum hydraulic capacity, and was required to discharge more frequently than allowed by their permit, due to lack of available storage.

To protect the receiving stream, the City considered different upgrade options. Factors that were considered during the planning process included capital cost, operation and maintenance cost, energy consumption, operator certification, and ability to meet low ammonia limits, even during extended periods of low winter water temperatures. Current effluent TAN (Total Ammonia-N) water quality standards in Iowa are in the range of 1 mg/L (summer) and 5-10 mg/L (winter). To many small municipalities, options for post-lagoon nutrient removal are restricted by limited budgets.

A number of different options were reviewed, including expansion of the existing lagoon system or building a new mechanical treatment plant. A continuous discharge aerated lagoon system was selected as the preferred option, which required that the effluent quality meet ammonia toxicity requirements year round.

Conventional aerated lagoon systems provide some ammonia removal in warmer months but are generally incapable of meeting ammonia limits during periods of low water temperatures (0.5°C). The SAGR® (Submerged Attached Growth Reactor) was the selected process to provide post lagoon ammonia removal and effluent polishing. This enabled Walker to retain and re-use its existing lagoon infrastructure.

SAGR process

The SAGR upgrade was designed in accordance with the Iowa Wastewater Facilities Design Standards and received DNR (Department of Natural Resources) approval in 2012. The SAGR is a patented process developed by Nelson Environmental. The system consists of an aerated gravel bed with a horizontal flow distribution chamber at the front end to distribute influent wastewater across the width of the entire cell. The aggregate is submerged, providing the necessary surface area for growth and attachment of nitrifying biomass within the bed, and is sized to optimize bacterial growth and hydraulic flow. A horizontal collection chamber at the end of the treatment zone collects the process effluent.

The SAGR system was specifically designed for cold temperature nitrification (conversion of ammonia to nitrates) following lagoons systems, which may experience winter water temperatures as low as 0.5°C for up to five months. Sizing of the bed is based on ammonia loading rates to provide year-round nitrification that easily meets ammonia discharge permit requirements.

An added benefit of the process is effluent polishing to BOD5 and TSS levels of less than 10/10 mg/L. Data from numerous SAGR facilities have also shown significant (99%+) reduction of fecal coliform bacteria, providing redundancy when paired with UV disinfection.



Figure 1 SAGR provides year round nitrification and effluent polishing

Ease of operation was a primary consideration during development of the SAGR. There are no sludge or solids management requirements, making the operation and maintenance of the process similar to that of a conventional aerated lagoon. The only moving parts in the system are blowers supplying oxygen to the process. Process control requirements are limited to seasonal (twice a year) manipulation of the influent control valves.

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Water Temperature	<1 C

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Figure 2 Aerial View of the Walker, IA WWTF in 2012.


Upgrade

In April 2012, construction began on the facility upgrade. The existing northern facultative cell was by-passed, and a three-cell aerated lagoon system was constructed within the footprint of

the existing southern facultative cell. Nelson Environmental supplied a fine bubble diffused aeration system for the two partial mix cells to achieve improved year-round BOD and TSS removal. Cell 3 is utilized for non-aerated settling, as required by Iowa DNR standards. Four (4) SAGR beds were constructed following the lagoon cells, and a UV disinfection system was provided for disinfection prior to discharge.

Commissioning and performance

Nelson Environmental staff provided commissioning and operational training on October 10, 2012. Results through the first winter of operation have been consistently meeting the new ammonia limits (See Figure 3, below). This upgraded performance is expected to continue and improve as the SAGR process matures to establish an optimal biomass film within the beds.

The design approach for the Walker wastewater treatment facility demonstrates the ability to resolve hydraulic capacity issues and provide nitrification, while maximizing the use of existing lagoon infrastructure. Capital costs are lower than construction of a mechanical treatment plant of equivalent treatment, and the system maintains simplicity of operation, with low ongoing O&M requirements. 

Walker, IA Influent & Effluent TAN

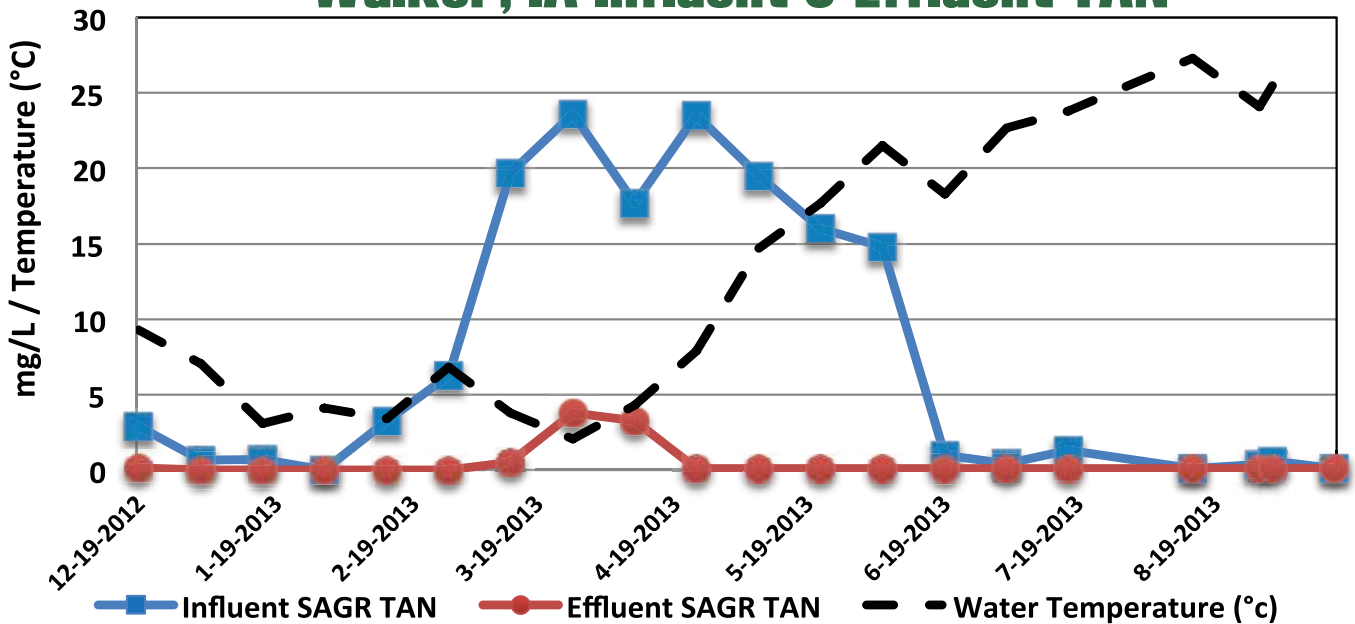



Figure 3 Influent & effluent SAGR TAN - (Average effluent TAN was 0.57 mg/L)



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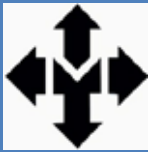
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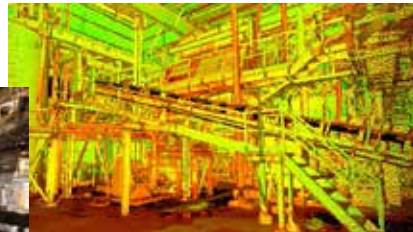


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Facing the Future:

A Perspective on Emerging Contaminants and Water Quality

By Mary Sadler, PE; Lamya Badr; and Ben Stanford, PhD

In recent years, the term 'emerging contaminants' has often been used to refer mostly to trace organic compounds such as pharmaceuticals and personal care products (PPCPs). However, the term is in reality much more broadly defined as a group of contaminants that is of emerging concern due to (a) new information about the presence, prevalence or sources of the contaminant(s), (b) new information about the toxicity or exposure to the contaminant(s), or (c) new regulatory perspectives that indicate a change in existing regulation or the eventual promulgation of a new regulation for the contaminant(s). Thus, 'emerging contaminants' can in fact apply to a wide variety of compounds that may be of concern to drinking water utilities and/or wastewater utilities due to their potential human or environmental health effects. Furthermore, emerging contaminants may be either chemical or biological in nature. Given our broadening understanding of the relationship between water quality, water treatment, the presence of contaminants, and climate change, and new directions from the US Environmental Protection Agency (US EPA), this article will focus on several groups of 'emerging contaminants' that may be on the future regulatory timeline from a drinking water perspective.

Regulatory Update

Currently, no single regulatory program in the US considers the entirety of the potential risk of emerging contaminants, which can lead to over-regulation as well as under-regulation. Commercial

regulation, the Safe Drinking Water Act (SDWA), and the Clean Water Act (CWA) are the primary avenues for chemical regulation. Commercial regulation evaluates chemicals for potential risk before they are approved for use and then released into the environment. The Food and Drug Administration (FDA) and the US EPA have regulatory jurisdiction over commercial regulation. The US EPA has sole regulatory authority over the SDWA and the CWA. The SDWA and CWA regulations address the fate and effects of chemicals after release into the environment. From a drinking water perspective, the national primary drinking water regulations (NPDWR) are used as the major mechanism for regulating contaminants in drinking water.

The US EPA has several programs to evaluate the public health impact and potential regulation of the many known and emerging compounds and microorganisms that are not currently subject to proposed or promulgated NPDWR. These contaminants are known to occur or anticipated to occur in drinking water supplies. Many of these unregulated contaminants are listed in either the Drinking Water Contaminant Candidate List (CCL) or in the Unregulated Contaminant Monitoring Rule (UCMR) program. The more well-known contaminants that may be the subject of either future regulations or an increase in regulation stringency include perchlorate, chlorate, additional non-regulated VOCs, chromium VI, nitrosamines and emerging contaminants. However, there is a great deal of uncertainty regarding potential regulation in light of current workloads in the US EPA's Office of Groundwater and Water, budgetary cuts, and evolving

strategies for attempting to regulate contaminants by group. Furthermore, new regulations can be proposed through political action, essentially bypassing the typical process for developing a national drinking water standard. Adding to the uncertainty in predicting future regulations is the US EPA's deviation from the use of no observable adverse effect levels (NOAEL) in the development of standards towards the use of no observable effect levels (NOEL). This deviation could represent a significant shift in US EPA's approach to regulatory determinations (Lynch, 2013).

Despite the uncertainty involved in future regulatory prediction, information is included herein based on discussion with staff at the American Water Works Association, (AWWA) staff at the US EPA, data collected during UCMR2, and information published in the Federal Register.

Perchlorate and Chlorate

The US EPA has decided to regulate perchlorate (ClO_4^-) under the SDWA with a maximum contaminant level (MCL) to be proposed before the end of 2013, though this date is uncertain based on recent recommendations from the Science Advisory Board (SAB) to pursue a pharmacokinetic-based model. Perchlorate is a potential health concern because it can disrupt the thyroid's ability to produce hormones needed for normal growth and development (both prenatal and postnatal), though the effects are closely related to dietary iodide intake. The US EPA's health reference level (HRL) for perchlorate sets

the stage for regulation as low as 1 $\mu\text{g/L}$, while the general opinion of experts in the field is that the proposed MCL will likely be in the range of 15 - 20 $\mu\text{g/L}$. Several states have already established a perchlorate MCL including California (6 $\mu\text{g/L}$) and Massachusetts (2 $\mu\text{g/L}$). Nevada has an action level of 18 $\mu\text{g/L}$. New Jersey has proposed a MCL of 5 $\mu\text{g/L}$ although the state is waiting until a decision from the US EPA before deciding on a perchlorate MCL. Sources of perchlorate include munitions, rocket fuel, industrial sites and hypochlorite.

In addition to perchlorate, chlorate (ClO_3^-) is another impurity commonly occurring in drinking water facilities that use bulk hypochlorite or on-site generated (OSG) hypochlorite. While ingestion of chlorate can impact the human thyroid in a manner analogous to perchlorate, it can also cause methemoglobinaemia (blood with increased levels of methemoglobin, which causes a decreased ability to bind oxygen and therefore reduced oxygen flow to organs and tissues), anuria, abdominal pain, and renal failure. However, these effects are all observed from the very high doses typically associated with accidental exposure to chlorate-containing pesticides and not from concentrations typically found in drinking water. In hypochlorite solutions, chlorate may form during manufacture, transport, or storage and the concentration of chlorate increases with the increase of time and/or temperature (Stanford et al., 2011). Chlorate has been placed on the US EPA's third Contaminant Candidate List (CCL3) and

consequently, it has also been included in the third Unregulated Contaminants Monitoring Rule proposed list (UCMR3). The US EPA has also announced a chlorate health reference level of 210 $\mu\text{g/L}$. Therefore, chlorate is likely to be regulated in the future and could be relevant to the any utility that uses OSG hypochlorite systems. There is no known control strategy at this time for chlorate in OSG hypochlorite, so obtaining additional baseline data for OSG chlorate production may be a future need.

Treatment technologies and practices for both chlorate and perchlorate focus on contaminant removal and include ion exchange, biological reactors, electrochemical reduction and control of hypochlorite storage and handling.

Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs) are a group of contaminants for which the US EPA has recently decided to increase regulation stringency. Many VOCs are found in groundwater and have been evaluated for potential human health effects. VOCs have been found to cause eye, nose and throat irritation in addition to liver, kidney and central nervous system damage. Some VOCs are also suspected or known human carcinogens (US EPA). There are currently eight regulated VOCs. The US EPA plans to regulate eight additional compounds as well as revise the regulations for the currently regulated VOCs. In particular, the currently regulated compounds trichloroethylene (TCE) and tetrachloroethylene (PCE) will

receive more strict regulations due to scientific advances allowing for treatment and monitoring at a lower MCL. The following eight VOCs are proposed to be regulated as part of US EPA's contaminant grouping strategy (in addition to the eight VOCs that are currently regulated): aniline; benzyl chloride; 1,3-butadiene; 1,1-dichloroethane; nitrobenzene; oxirane methyl; 1,2,3-trichloropropane; and urethane. Common treatment methods for VOCs include granular activated carbon (GAC), air stripping, reverse osmosis, and conventional filtration.

Chromium VI

A recent report from the Environmental Working Group has sparked renewed interest from the US EPA in chromium VI. Chromium VI, previously thought to be only a contact hazard causing allergic dermatitis at long exposures to high concentration, has more recently been associated with oral cancer in rats and cancer of the small intestine in mice via oral exposure routes. Chromium is a naturally occurring metal in rocks, plants, humans, soil and volcanic dust, and animals. It is mostly present as chromium III, chromium VI, and the metal form of chromium, the latter two of which are produced in industrial processes. The 'III' and 'VI' indicate the oxidation state of the compound. Major sources of chromium include steel and pulp mills and natural deposit erosion. Instead of regulating chromium VI as a single contaminant, the US EPA currently regulates the total concentration of chromium in drinking water, with an MCL of 0.1 mg/L. California regulates the total chromium concentration at 0.05 mg/L and has a draft public health goal of 0.02 $\mu\text{g/L}$ for chromium VI. Due to emerging research, the US EPA has proposed in the September 2010 draft human health assessment that chronic chromium VI exposure be classified as a probable carcinogen. When the draft human health assessment is finalized, a comprehensive review will be completed to determine if a new chromium standard should be set (US EPA, 2010). While the chemical fate and transport of chromium III and VI is not well understood in the distribution system, there are treatment technologies for the removal of chromium VI in source water including the reduction/coagulation/filtration (RCF) process, weak base anion exchange, strong base anion exchange, reverse osmosis and electro dialysis.

Nitrosamines

The rise in the popularity of chloramines for secondary disinfection purposes has also brought increasing awareness to the preva-

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lence of nitrosamines in drinking water, in particular *N-nitrosodimethylamine* (NDMA). Nitrosamines are disinfection byproducts (DBPs) that form from the oxidation of precursors in chlorinated and chloraminated waters. They have been found to strongly correlate with chloramine usage. Additionally, nitrosamines can be associated with the use of certain polymers (e.g., POLY-DADMAC) and ion exchange resins (e.g., MIEX) in water treatment processes (Gan et al., 2013). Research has indicated that nitrosamines are likely carcinogenic and are linked to other diseases such as Alzheimer's, Parkinson's, and type 2 diabetes. Their presence in drinking water may pose a serious health risk to consumers. Nitrosamines are not yet regulated with a standard MCL, but the US EPA has placed five nitrosamines on the final third CCL3. The US EPA is also considering a specific nitrosamine rule. Based on the California regulation, the US EPA's regulatory limit may be as low as 10 ng/L with a MCL goal (MCLG) of zero due to the fact that nitrosamines are considered carcinogenic compounds. Treatment for nitrosamines typically involves the use of GAC, biologically active carbon (BAC), or high-energy photolysis by ultraviolet light (at doses typically 10 – 40 times higher than disinfection doses).

Endocrine Disrupting Compounds, Pharmaceuticals, and Personal Care Products

Another well-popularized group of contaminants that may be increasingly regulated in the future is emerging contaminants, also known as microconstituents, micropollutants, or trace organics. These contaminants include pharmaceutically-active compounds (PhACs), personal care products (PCPs), endocrine-disrupting compounds (EDCs), and other organic compounds. There has been a recent increase in scientific and public interest in these compounds as they are being discovered in surface waters, groundwater, wastewater treatment plant effluents, and drinking water. The potential impact of these compounds on human health and wildlife, especially at the nanogram per liter (ng/L) concentrations typically encountered in surface waters, is not yet completely known, though risk to human health is generally quite low. Sources of endocrine-disrupting compounds as well as other emerging contaminants include domestic sources such as human excretion and flushing of expired drugs, agricultural runoff, industrial sources, and solid waste. There are currently no sets of federal or state regulations that specifically address PhACs,

PCPs or EDCs, although there are national primary drinking water standards for many synthetic organic chemicals.

Many personal care products fit within the emerging contaminants category, though the one of current regulatory concern are the perfluorinated compounds (PFCs), which can be found in Scotch Guard™, Gore Tex™, and Teflon™. The regulatory fate of PFCs is currently uncertain, as little is known about its occurrence or effective treatment. While specific treatment technologies for PFCs are unknown, it is suspected that GAC and high-pressure membranes, such as reverse osmosis (RO) and nanofiltration (NF), will be effective barriers.

The US EPA has included seven endocrine disrupting compounds (all being steroid hormones) on the UCMR3 released in 2010. However, it is unlikely for US EPA to regulate these particular emerging contaminants due to their low occurrence levels and generally rapid oxidation by free chlorine. In general, treatment technologies for the group of emerging contaminants include GAC, powdered activated carbon (PAC), free chlorine, ozone, ozone/peroxide, UV/peroxide and RO/NF membranes. The US EPA is currently very active in research and analysis of these compounds and is developing strategies to protect the health of both the public and the environment. Additionally, some states and local communities are becoming more involved in helping consumers properly dispose of pharmaceuticals and personal care products.

Algal Toxins

An additional group of contaminants that may potentially be regulated are algal toxins that occur as a result of algal blooms. While algal toxins may also co-occur with taste and odor-causing compounds, they are not strongly correlated with each other. Treatment processes for algal toxins include GAC, PAC, ozone and UV advanced oxidation. While the regulatory future of algal toxins is uncertain, it may be prudent to conduct targeted analysis (i.e., during algal blooms and/or taste and odor events) to monitor for compounds such as microcystin and

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anatoxin-a along with 2-methylisoborneol (MIB) and geosmin in the raw water to determine if there is a co-occurrence.

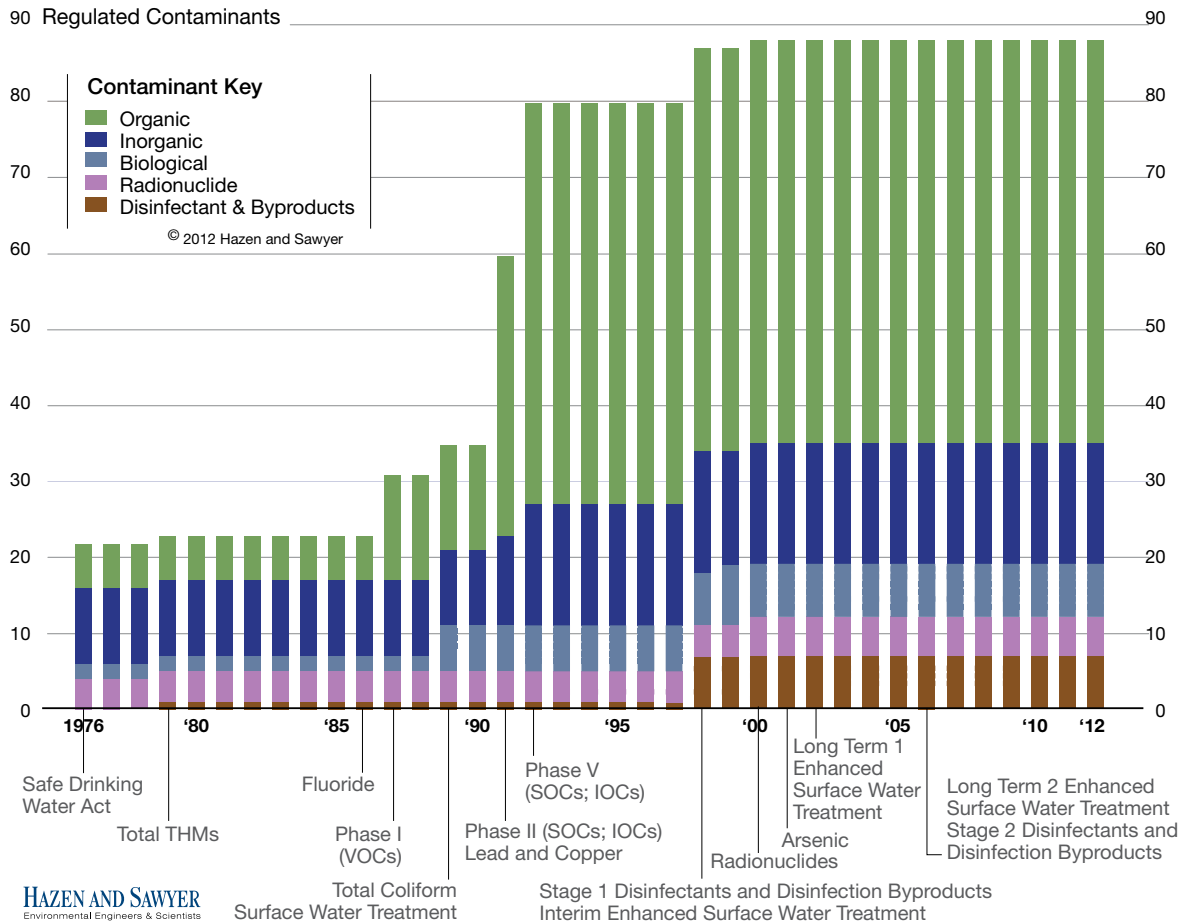
Disinfection Byproducts

Emerging disinfection byproducts consist of myriad compounds that are produced as a result of reactions between disinfectants and natural organic matter (more than

700 have been identified to date). These byproducts include trihalomethanes, haloacetic acids, chloral hydrate, bromochloroacetic acid, among others, and a category of unknown organic halogens. Due to the uncertainty in the occurrence and toxicity of the emerging DBPs, there is much debate regarding potential public health relevance. One primary concern among scientists,

as well as the public, is the comparison of DBPs that are formed using chlorine disinfection with those that are formed using chloramine disinfection, though there is no evidence that individuals in the US drinking chloraminated water have any different cancer risk than those drinking chlorinated water. Also, the use of chloramines reduces the overall exposure to DBPs relative to

Number of Regulated Contaminants and Drinking Water Guidelines



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free chlorine, which may be of potentially greater benefit. Treatment process and control methods for the removal of DBPs, including emerging DBPs, include changing the point of chlorination or chloramination, enhanced coagulation, UV or ozone disinfection, GAC, ion exchange, and high-pressure membranes.

Microbial Contaminants

Microbial contaminants are pathogenic organisms that include bacteria, viruses, and protozoa. Microbial contaminants associated with drinking water may cause acute illness. Microorganisms, such as *Cryptosporidium* or *Giardia lamblia*, can cause gastrointestinal illness; additionally, microorganisms such as *Legionella* can cause Legionnaire's Disease, which is a type of pneumonia. In general, most disease caused by microbial contamination (e.g., bacteria, viruses, spores, fungi, amoebas) of water is associated with symptoms of diarrhea, cramps, nausea, jaundice, and headaches and fatigue. Enteroviruses and noroviruses are currently on the UCMR3 due to concern regarding their presence in ground water supply systems. Pathogens in biofilms, such as *Legionella* and *Naegleria fowleri*, are also microbial contaminants of concern as they can thrive in plumbing systems of hospitals, hotels, schools, homes, and factories. Additionally, as detection methods for *Cryptosporidium* and *Giardia* testing improve over time (as required by the Surface Water Treatment Rule), the detection frequencies of these pathogens may increase, and consequently shift the bin placement for some utilities. Examples of possible measures for controlling microbial contaminants include changing filtration or disinfection practices, altering the distribution system residual disinfectant, and improving private management practices of premise plumbing systems.

In general, contaminants that are likely to be regulated in the near future include perchlorate, chlorate, VOCs, nitrosamines, manganese, and UCMR3 compounds. Furthermore, the US EPA is re-evaluating the MCL for chromium III and may be adding an MCL for chromium VI. Considered holistically, the USEPA has a very full plate and the largest uptick in potential regulated contaminants seen since 1996, and therefore many of these regulatory deadlines may be pushed out several more years into the future. Thus, many of the contaminants (or potential contaminants) listed in the preceding descriptions may not receive a positive or negative regulatory determination (i.e., deciding to move forward with creating a regulation and MCL ('positive'), or deciding NOT to regulate ('negative') until the 2017 – 2025 timeframe. The exceptions to this are nitrosamines and chlorate, which could receive a positive regulatory determination by the end of 2013 and a final rule by 2017.

The Public Challenge

Information management requires a non-linear and indirect approach when conveying information to the public. Communication to the public must be carefully managed, and can take the form of having information ready when needed, an established website with a Frequently Asked Questions page, or a full-blown media response plan. Utilities around the county have taken either reactive or pro-active approaches to risk communication. A utility poll conducted by the Water Environment Federation in 2009 revealed a mixed review on the public reaction to utility pro-active approaches. Several utilities reported that they gained credibility on the emerging contaminant issue and other issues while other utilities acknowledged that public reaction was short lived.

Utilities are also becoming increasingly aware of the importance of internal management. The emerging contaminant issue is extremely complex such that the issue affects many different aspects of water and wastewater, including laboratory, stormwater, pretreatment, treatment, and regulatory compliance. A challenge is managing the data collection and issues arising from multiple departments. In response, many utilities have assembled a task force with members drawn from multiple departments and levels of management to help stay current with the latest research and regulatory issues. **DN**

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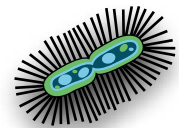
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Buyers' Guide

Welcome to our *Digested News* Buyers' Guide. On the following pages, you will find information that will help you meet your purchasing requirements throughout the year ahead. The initial three pages of this Guide list categories of products and services along with the various companies that can provide them to you. The remaining three pages provide an alphabetical listing of the companies as well as the contact information you will need to reach them. All companies listed in this Buyers' Guide are advertisers in this issue of *Digested News*.

- **Company Listings**
- **Products & Services Source Guide**

Buyers' Guide

Products & Services Source Guide

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USU students receive Water Environment Association of Utah awards

By Mary-Ann Muffoletto, College of Science / Quinney College of Natural Resources, Utah State University and Gary Vance, WEAU Student Activities Chair

Two Utah State University engineering students are 2013 recipients of scholarship awards offered by the Water Environment Association of Utah and, for the first time since the program's 2003 inception, the Aggies captured both the undergraduate and graduate level prizes.

Morris Demitry, a doctoral student in environmental engineering, was honored with the Dr. Robert W. "Bob" Okey Scholarship at the graduate level, while undergraduate environmental engineering student Daniel Ryan received the undergraduate level award. Both students received \$3,000 scholarships in a ceremony held November 12, during the WEAU



USU doctoral student Morris Demitry, left, displays his scholarship check with faculty mentor Michael McFarland. Demitry is conducting research to optimize wastewater resource recovery with Utah's Central Weber Sewer Improvement District.

Mid-Year Conference in Salt Lake City.

"We are extremely proud of Morris and Danny, who have made outstanding achievements in their respective research projects and studies," says Michael McFarland, associate professor in USU's Department of Civil and Environmental Engineering, WEAU board member and faculty mentor to both students.

Demitry, who earned a master's degree in environmental engineering from USU in 2011, is evaluating the potential of enhanced energy production from municipal wastewater treatment plants. He is currently working with Utah's Central Weber Sewer Improvement District on a project to enhance biogas from co-digestion of municipal sludge and food waste that can be used for electricity production.

Ryan, who will complete his bachelor's degree in May 2014, is an active member of USU's Engineers Without Borders chapter and serves as president of USU's WEAU student chapter. Utah State's WEAU chapter is currently involved in a number of projects, including outreach to K-12 students.

"We are grateful to College of Engineering Dean Christine Hailey, who has provided guidance and encouragement for USU's WEAU chapter," says McFarland, advisor to the student chapter. "Membership in the



USU students and WEAU scholarship recipients Daniel Ryan and Morris Demitry are congratulated by WEAU president and USU alum Dru Whitlock '97, senior manager with CH2M Hill in Salt Lake City.

association offers outstanding educational activities for our students, as well as opportunities to network with professionals."

In addition to the scholarship awards, three posters were submitted for the student poster competition and set up in the lobby of the mid-year conference. Conference attendees voted on the winning poster submitted by Mitch Hogsett, a Ph.D candidate at the University of Utah. Mitch received a \$500 prize for his poster summarizing his years of research on the Jordan River.

Established in 1957, the WEAU is Utah's state affiliate of the national Water Environment Federation. The federation is comprised of water quality professionals including public works staff, treatment plant operators, engineers, scientists and planners working to preserve and enhance water quality and the global water environment.

YP Connections

By Jennifer Davis, Water Resources, MWH

Happy Holidays All!

Its time again for me to solicit for articles for the next edition of *YP Connection!*

If you do not know, *YP Connections* is the Water Environment Federation YP national newsletter that is published three times a year. The main goal of the newsletter is to highlight all the work that YPs are doing within their MA as we will be the new generation of leaders in the water industry. With the preparation of each newsletter, we would like to ask for updates on the MA's student and YP groups.

The first trimester of 2014 which focused on activities from September

through December 2013

If your Students / YPs had any events (yp events at an annual conference, public outreach events, tours, ect) during this time period that you would like to include in the next issue of *YP Connections*, please send me the information. We would love to include more information on what students /YP are doing across the nation! Pictures are always great to include, we want to showcase that YPs are getting out in the community, helping other YPs, and contributing to this profession. If you include pictures, please let me know who is in them.


If possible, please provide this informa-

tion by December 13, so we can include this info in our next edition.

We would love to hear from you and want to create an open dialogue with the MAs, as those are the core of where leadership begins before moving to the national organization.

For parties that are interested in signing up to receive notifications when the newest newsletter is available, you can contact YPCconnections@wef.org.

If you this email is better suited for someone else in your YP group please let me know and I will update my contact information.

Thank you for your time and your help! 

WEAU Young Professional 2014 Ops Challenge Team

The Operator Challenge is a great opportunity to try your skills both mentally and physically. It is also a place where many friendships have begun. First place in the WEAU ops challenge will have the opportunity to represent the WEAU at WEFTEC in New Orleans, LA. Each team has five members, four participating and one coach.

The Operator Challenge consists of five events: a process test, collections, safety, maintenance, and lab. Each event presents its own set of challenges to overcome in the industry. To see more about each event visit these sites.

Overview

<http://youtu.be/UCxFrHHIJP>

Collections

<http://youtu.be/KWtod3sb0s8>

Maintenance

<http://youtu.be/p700GUb2Rmk>
(might be changing to the Godwin pump)

Lab

<http://youtu.be/FQdgV0xs4NM>

Safety

<http://youtu.be/1Y6iait9QGI>

Process – we have old tests to practice and review to prep for this.

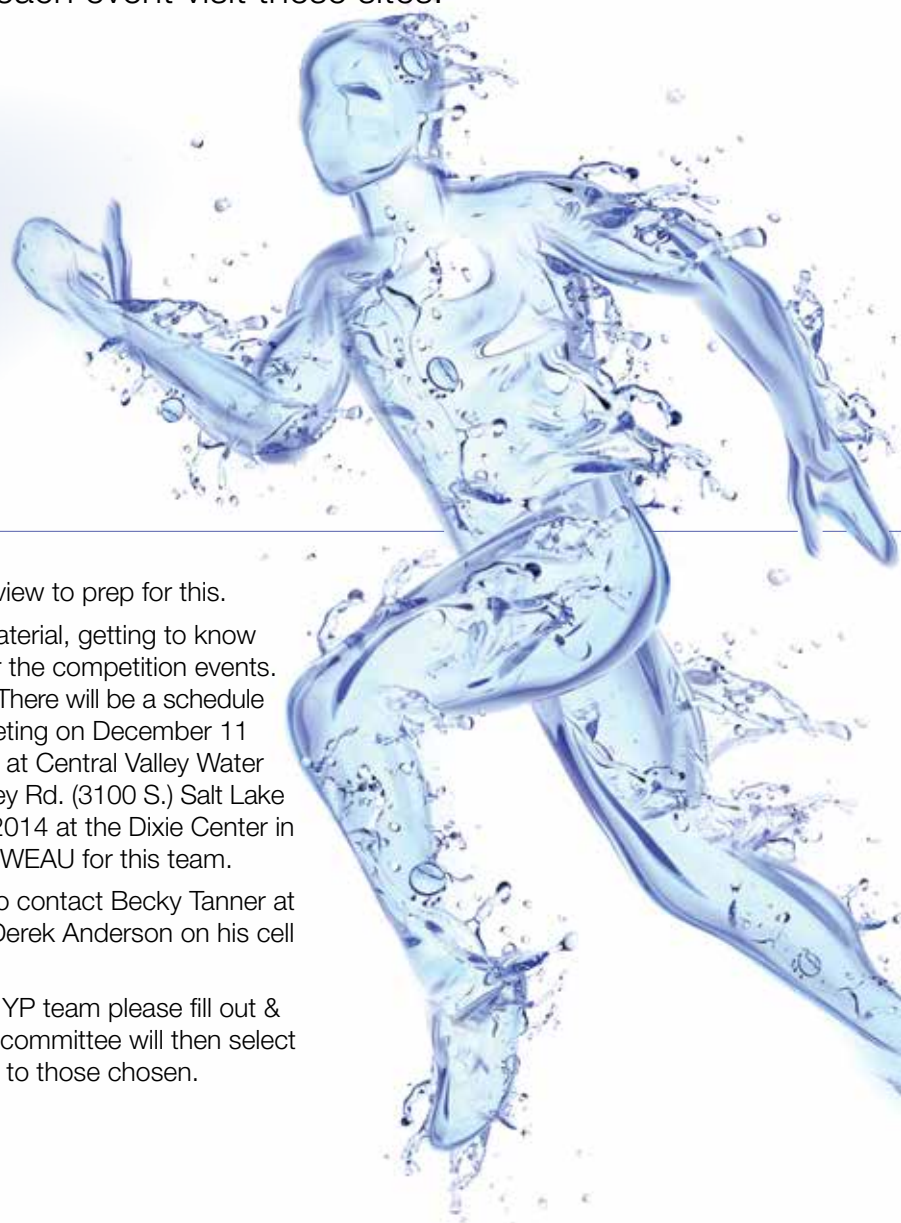
Some time commitment is needed for studying material, getting to know your team, and understanding what is required for the competition events. Equipment will be provided for practice by WEAU. There will be a schedule handed out at the Operator Challenge Kickoff meeting on December 11 at 10:30. The Kickoff meeting & equipment will be at Central Valley Water Reclamation Facility, located at 800 W. Central Valley Rd. (3100 S.) Salt Lake City. The Challenge is April 30, 2014 thru May 1, 2014 at the Dixie Center in St. George. Accommodations will be provided by WEAU for this team.

If you have more questions or concerns feel free to contact Becky Tanner at Tannerb@cvwrf.org or 801-973-9178 ext 148 or Derek Anderson on his cell 801-885-2944

For those interested in participating on the WEAU YP team please fill out & return the questionnaire to yp@weau.org. The YP committee will then select the members of the team and extend an invitation to those chosen.

Thanks

The WEAU YP Committee



Water Environment Association of Utah

Preservation and Enhancement of the Water Environment

Dear Wastewater Professional:

You are invited to attend some valuable training. The WEAU Combined Committee Effort (CCE) is pleased to offer the "First Annual WEAU Conference on Compounds of Emerging Concern" at the Utah State DEQ Board Room. The seminar and a delicious lunch are included as well as the opportunity to share experiences with your colleagues. Please take the time to complete the registration form and return it with your check made out to WEAU. Payment is due at the time you register. We look forward to seeing you there!

Date: January 29th, 2014

Training Title: "First Annual WEAU Conference on Compounds of Emerging Concern"

CEU's offered: 0.6 hours. You will need to sign a roll sheet to receive credit.

Schedule:

07:30 to 08:00	Registration at the Utah State DEQ Board Room
08:00 to 08:15	"Introduction to the Microconstituents: Compounds of Emerging Concern (CEC)" -Ken Burgener of NDSD
08:15 to 09:00	"Snyderville Basin-A Case Study" -Mike Luers of Snyderville Basin WRD and Clint Rogers of Carollo Engineers
09:15 to 10:00	"The Treatment and Fate of Compounds of Emerging Concern" -Dr. Henryk Melcer of Brown and Caldwell
10:00 to 10:20	Break and refreshments
10:20 to 11:00	"Impact of Compounds of Emerging Concern (CEC) on Reuse Applications" -Andrew Salvesson of Carollo Engineers
11:10 to 12:00	"Microconstituents: What to Expect in Your Permit" -Sarah Reeves of Brown and Caldwell
12:00 to 12:45	Lunch-Pat's Barbecue- http://www.patsbbq.com/
12:45 to 13:30	"MRSA, Enterococcus and Viruses in Wastewater Discharges across the Wasatch Front"-Ken Burgener and Michael Sadler of NDSD
13:30 to 14:15	"Emerging Concerns about a very old Pest, the Cyanobacteria of Farmington Bay"-Dr. Theron Miller and Brad Marden of The Jordan River/Farmington Bay Water Quality Council
14:15 to 14:30	Break and refreshments
14:30 to 15:00	"Analysis of Endocrine Disruptors in Water using GCxGC-TOFMS" -Dr. Naomi Diaz of LECO
15:00 to 15:30	"Analysis of the Endocrine Disruptors"-Dan Henderson from Chemtech-Ford

Location: **Utah Department of Environmental Quality**
195 North 1950 West, Salt Lake City, Utah
Office: 801-536-4400 Hotline: 1-800-458-0145

Cost: WEAU Members - \$50.00
Non-members without membership - \$65.00
Non-members including a one year PWO membership - \$80.00

Deadline: Please make your reservation by January 15, 2014.

Limited to the first 100 applicants!

Call Ken Burgener at 801-728-6825/kburgener@ndsd.org or Tom Pendley at 801-430-1894/tpendley@ndsd.org with any questions.

Please print clearly

Name:
WEF Membership No.
Email Address
Company Name
Phone No.
You may register online at WEAU.org and pay by credit card OR Mail checks (payable to WEAU) and completed registration form to Tom Pendley/WEAU North Davis Sewer District 4252 W. 2200 S. Syracuse Utah 84075
Detach and mail with payment

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Treatment Training

By Sharon Burton

WEAU's Treatment Training will resume in January in preparation of the April 14, 2014 Wastewater Exam.

Check the Utah Water and Wastewater Training Calendar for the start date.

Training will be at CVWRF and Sharon Burton will be teaching.

The class is free. .2 CEUs per class, must sign the attendance sheet.



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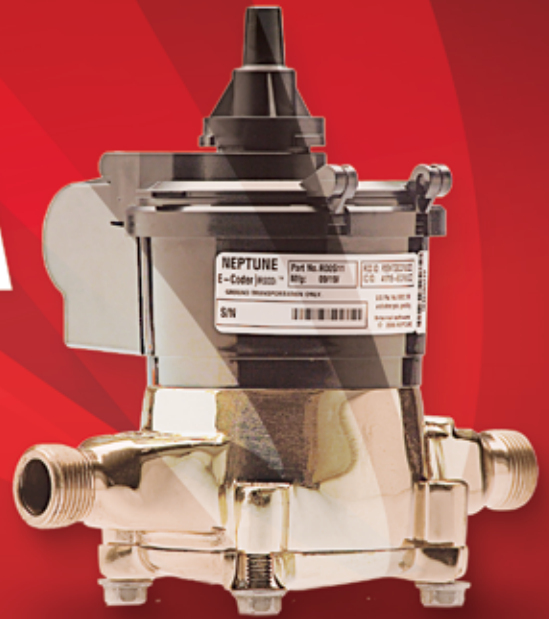


To reach Utah's water industry professionals through the *Digested News* magazine and its targeted readership, contact Kris at your earliest convenience to discuss your company's promotional plans.

Kris Fillion, Marketing Manager

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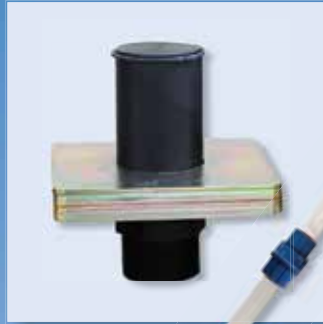
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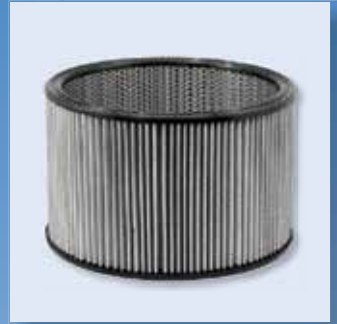
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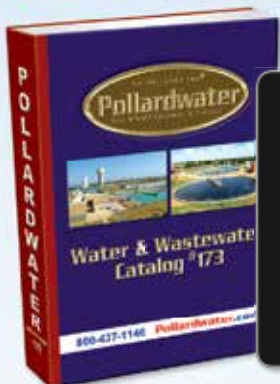
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