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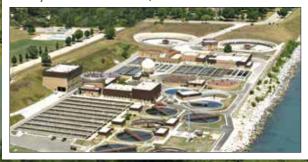
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AUGUST SERVICE TRIP REPORT DOMINICAL, COSTA RICA

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City of Racine, Wisconsin



Water Environment

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Call for Awards 90th Annual Meeting

Call for Abstracts 90th Annual Meeting



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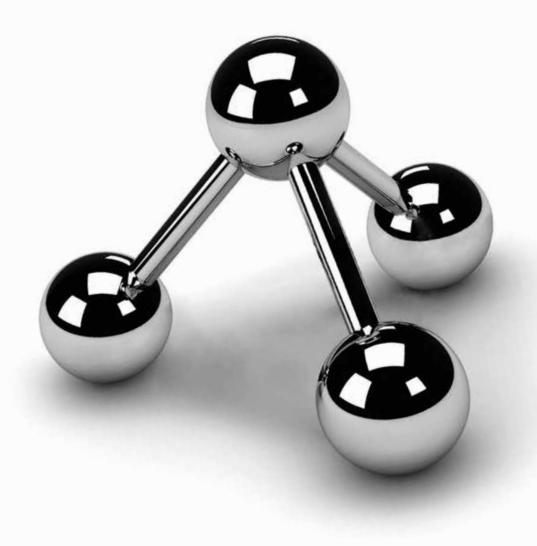
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Why is Clean Water Important to You?



By Pat Oates

"Water is to me, I confess, a phenomenon which continually awakens new feelings of wonder as often as I view it."

- Michael Faraday

n the aftermath of the Flint, MI, water problems, I recently heard a discussion on the radio regarding the importance of clean water. All of us are familiar with the societal value of clean water. Clean water allows us to live better lives that are free of disease, and it is part of the supply chain for industries that produce the products that are necessary (and luxurious) parts of our daily lives.

After listening to that program I asked myself: Why is clean water important to me? To answer this question, I decided to keep a daily water journal to see how many ways I interacted with clean water in one day. I counted only water in this tally, not products that contained water and the results were way, way higher than I expected. Here's a brief summary of my journal.

First thing in the morning, I used the bathroom, showered, got water for coffee and oatmeal, and washed the dishes from breakfast and the lunch I prepared. I then filled my water bottle for the ride to work, and got annoyed when my shoes got wet from the dew on the grass on the way out to my car. At work, I filled my water bottle eight times, made coffee twice, had water with lunch, then washed more dishes. At home I used water when making dinner (washed more dishes), watered my pets, did laundry and watered the garden, washed my car and showered again after getting dirty in the garden. So at the end of that day I connected with clean water 82 times, which is more than double what I anticipated (and I'm sure I missed a few in this total). Now I know we have many water data geeks out there, and the point of this is not to debate what should and shouldn't be counted in this exercise, it is to illustrate just

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how much water has become an integral part of our daily lives and how having access to clean water makes our lives safer and more comfortable.

However, the more I thought about this, access to clean water goes way beyond necessity because clean water enriches us in any number of ways. We all need to take breaks from our daily lives; when we take vacations many of us go to the beach where, hopefully, the water is clean. Those of us that ski need clean water to make snow, and those that like the desert tend to collect around an oasis where there is water. I am grateful that when I canoe the Cannon River in Minnesota, it is clean and free of floating debris unlike the Rouge River, which I played by in the 1960s. Blue zones where people live the longest are mostly located by water, and parks are developed near water. Whether it is a river, a lake or a stream, people like to be near water as it helps reconnect us with nature, refresh and vitalize us. I feel fortunate to work in a profession that provides such a valuable resource for our communities and in the end when I ask: What does clean water mean to me? I have to answer, almost everything!

Challenge yourself and your friends to keep a water journal to see how many times you connect with clean water over the course of one day as I think the results will surprise you. Then based on the results of your journal answer the question, What does clean water mean to me? Then, send me any insights you might have as a result of your challenge patricia.oates@metc.state.mn.us and we might publish them in a future issue of Central States Water. CS

"Thousands have lived without love, not one without water."

– W. H. Auden





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WEF Updates

By Doug Henrichsen and Eric Lynne





TRANSITIONS

Eric Lecuyer will rotate off of the WEF House of Delegates (HOD) after the first half of the HOD meeting at WEFTEC this year. Eric has served Central States and WEF in many roles during his long tenure with these organizations. Eric first served as a WEF Director on what was called the WEF Board of Control from 1995 to 1998 in the role of PWOD Zone Representative. Eric later served as president of CSWEA in 2002 to 2003. After his presidency, Eric took the challenging position of Executive Director from 2003 thru 2012. He then served a three-year term as a WEF Delegate from 2013 to 2016. Eric, his wife Anne, and his family, have played a very important role in helping to shape CSWEA into the organization that we are today. Both Central States and WEF are greatly indebted to Eric for his past service and his ongoing commitment to the association, federation and the water environment.

Delegate Doug Henrichsen will continue to serve as a WEF Delegate. Incoming WEF Delegate Eric Lynne's term will begin during the second half of the HOD meeting during WEFTEC as he will replace Eric Lecuyer on the HOD as well as on the Central States Executive Committee. While having big shoes to fill, Eric Lynne's past experience and service to Central States are sure to guide him as part of the delegation that represents Central States members on the WEF House of Delegates.

UPCOMING WEF HOUSE OF DELEGATES MEETING

The WEF House of Delegates (HOD) will hold their annual meeting on Saturday, September 24, 2016 in New Orleans during WEFTEC. CSWEA's outgoing WEF Delegate Eric Lecuyer, Doug Henrichsen, and incoming Delegate Eric Lynne will attend. In the morning, outgoing Speaker of the House Jamie Eichenberger will chair the HOD

meeting with reports from all committees and workgroups. Table Talk discussions between various MAs will also be conducted to allow for better communication on specific ideas. The morning session will also include confirmation of the incoming WEF president, Board of Trustees, and delegates. Starting late morning, a WEF Community Service Project (see below) is planned for all delegates to participate in helping others in the New Orleans community. In the afternoon, the incoming Speaker of the House, Howard Carter from the New England WEA, will lead sessions covering the WEF business and committee meetings.

The HOD Standing Committees for 2016-17 are:

- Budget
- Outreach
- Nominations
- Steering

Doug will continue to serve on the Budget Committee, and Eric has been selected to serve on the Outreach Committee. The Outreach Committee is new for 2016 and will focus on sharing WEFs work products with CSWEA and other member associations.

Various Work Groups will also be formed, each with a various topic to address.

A WEF Leaders Reception will then occur for delegates to attend and network in the evening.

HELP MAKE A DIFFERENCE IN NEW ORLEANS DURING WEFTEC

The Students & Young Professionals Committee (SYPC) of WEF invites you to give back to New Orleans this September. Since 2008, the SYPC has organized a community service project in the WEFTEC host city as a way to improve the local water environment and leave a positive and lasting effect on the community. This year's project, to be held on the grounds

of City Hall in New Orleans, will include the construction of bioretention cells and bioswales. These green infrastructure measures will help capture and filter stormwater runoff to alleviate flooding and improve water quality. The project will also help educate the community about water, the environment, and green infrastructure.

How can you help? Funding for the service project is provided through sponsorships and by donations — both monetary and material donations are welcomed. To support the 2016 Community Service project, complete the donation form posted on weftec.org or contact WEF Staff Caroline Pakenham.

How can you volunteer? Add the WEF Community Service Project to your WEFTEC registration. Volunteers spend 4-6 hours doing hands-on service work. Lunch and drinks are provided. Thank you for your generous support to this event.

WEFMAX 2016

Four locations have been chosen to host WEFMAX in 2017. WEFMAX offers an opportunity for MA leaders at all levels to join together, share success stories and ideas on how MA members can be better served. These fast-paced, interactive meetings are open to all members and provide for both enlightenment and networking with other leaders of the water profession from throughout North America and beyond. The locations and dates are as follows:

- March 29-31, 2017: San Juan, Puerto Rico (Puerto Rico W&EA)
- April 26-27, 2017: Cincinnati, OH (Host is Ohio WEA)
- May 10-12, 2017: Winnipeg, Manitoba, Canada (host is Western Canada WEA)
- May 31-June 2, 2017: Austin, TX (Host is WEA of Texas) ^{CS}

Where Water Flows Food Should Grow



By Mohammed Haque

ood Grows Where Water Flows®"

— that's what the sign said as we
entered the Berrenda Mesa Water
District somewhere inland in
California between San Francisco
and Los Angeles. We were on our way to
Bakersfield from Monterey on the Haques'
summer trip, a little adventure that
included stops in Death Valley National
Park, Yosemite National Park, and the San
Francisco Bay area.

There's a fierce battle over WATER going on in California and those areas tributary to the Colorado River. You may have seen a documentary on the Discovery channel this summer called Killing the Colorado that looked at the water crisis that is affecting the west. At its core, the water issue is about supply and demand of a limited resource (water), the high cost of infrastructure and inefficiencies to transport water to parched areas and the market economics (water rights) related to it.

The area that we traveled through was one of those parched areas and along that road were miles and miles of pistachio and almond tree farms.

Coalitions like the California Farm Water



Coalition are trying to ensure that there is the needed supply of water for the farms that they represent. They operate in a very complex market environment where farms growing profitable crops (pistachios, almonds, etc.) have the resources to dig deeper wells and purchase more water rights. Sometimes they do this at the expense of a homeowner whose well has dried up and who doesn't have the resources to go deeper with their well. So in a display of poor water-sense, the thirsty, yet profitable pistachio or almond tree gets the water it needs (check Podcast Episode #640 entitled Bottom of the Well on NPR's **Planet Money**).

But this is not always the case. Farmers, too, have to make decisions, and at some point the reality of the water market overcomes the twisted economics of thirsty crop farming. Farms are reducing their crops or abandoning the thirsty crop because they don't have the water to keep them going.

Such appears to be the case in this one farm where you can see chopped trees next to trees that were still producing nuts. So what do they do next? Interestingly enough, just a few miles after the rows and rows of pistachio trees are rows and rows of oil wells. Are we reaching a state where the worth of water is getting closer and closer to the worth of oil? What a fascinating question...sure makes you think. After all, without water, there's no food, but without oil, well...we have all kinds of things (wind, solar, natural gas, and lo and behold, biosolids!).





Luckily for the Haques, we got to see some other water splendors on this trip. Both the majestic lakes and streams in Yosemite National Park and the spectacular bay in San Francisco provided water highlights on our trip.

Seeing places like Death Valley National Park give you a profound respect for water and its abundance in the Midwest.

The drive through the central valley of California and seeing first hand the water issues that they are contending with on a physical, philosophical, and political level was very eye-opening. I hear that Wall Street is getting involved with the water rights market in California. When market forces take over. I don't see how the Midwest can distance itself from the droughts in California. After all, when we can build a pipeline (Keystone) from the Alberta Tar Sands to refineries in Texas and Louisiana, what's to say we can't pump water from the Great Lakes to the thirsty pistachio and almond trees in California. If that seems absurd to you, maybe it's time to start thinking about Where Water Flows Food Should Grow. CS







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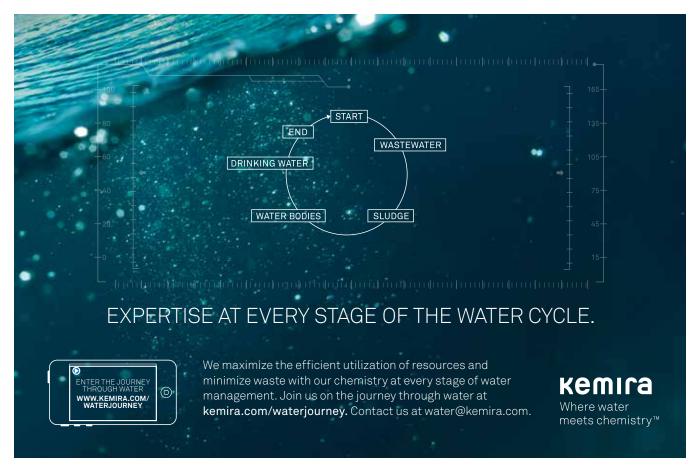


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OVERVIEW

This has been a big summer for the Global Water Stewardship (GWS)! CSWEA professionals who have been involved with GWS spent a week in Costa Rica this August hard at work to move their three current projects forward. The crew included CSWEA members Amanda Heller, Mohammed Haque, Mike Holland, Matt Streicher, Alex Knicker, Manuel de los Santos, and Liz Bohne. They were joined by four university students/recent graduates and winners of the CSWEA student design competition back in April for the Bahia Ballena problem statement; Jordan Fure, Gage Thompson, Zachary Wallin of UW-Platteville, and Jill Vande Boom from Milwaukee School of Engineering. The group spent the majority of their time working with local government organizations and the local community to raise awareness, and support for the projects.

GWS was founded in 2013 by CSWEA Executive Director Mohammed Hague after a trip to Costa Rica with a goal of implementing centralized wastewater treatment solutions in the developing world. The communities we are working with in Costa Rica currently have no system to treat greywater which flows directly to the ocean, and typically have poorly managed and under maintained septic systems for their blackwater. GWS has undertaken three initial projects, one each year, since its initiation with Piedras Blancas community in 2014, Bahia Ballena in 2015, and Dominical in 2016. Below is a recap of our visit with each community during the trip and an update on the project statuses.

PROJECT STATUS:

PIEDRAS BLANCAS

The Piedras Blancas project is GWS' pioneer project and was the topic of the 2015 student design competition.

The project continues to progress, and the group spent some time during the week working through some new hurdles. As far as the engineering work goes, the design is complete. This was done by student design competition winners from 2015. It was then reviewed and refined, and drawings were produced by GWS members, and submitted

Piedras Design Aerial Overlay



Piedras Blancas



Dominical





to RQL, a Costa Rican engineering firm that has partnered with GWS to ensure that all work that is completed will be in compliance with Costa Rican codes. RQL prepared the final drawings, and then submitted them to Costa Rican authorities for approval for construction.

On the August 2016 trip, the group spent an afternoon in Piedras Blancas walking through the village to assess the current situation and met with the local government authorities to discuss the next step for project implementation. In the previous years, the group witnessed odors from sewage and waste in the curb and gutter system. This situation had not improved, and it appeared that the presence of waste and greywater in the streets was increasing.

Sharon Alfaro, a Piedras Blancas resident and GWS contact who has been passionate in helping us to resolve wastewater issues in not only her community but surrounding communities as well, has worked to teach village members and children about the importance of clean water and proper sanitation. She has gone door to door to collect signatures from residents supporting the project and agreeing to pay for the increase in their monthly water bills in order to maintain the system once it is in place.

There has been some difficulty in land acquisition due to zoning issues. Currently, the land selected is owned by the Osa Municipality. It will be necessary to transfer land ownership to the ASADA, the local water authority, and re-zone. GWS is currently assessing two different options, either work with RQL to re-zone land and transfer land ownership, or purchase a different site. One potential site is owned by a community member and ASADA Board Member who is supportive of the project.

For a complete description of this project, check out the Fall 2014 issue of Central States Water at www.cswea.org/magazine/.

BAHIA BALLENA

Bahia Ballena is small rural village that is dependent on tourism. The direct translation of Bahia Ballena is very suitably "Whale Bay". It is a hot spot for tourists due to its unique whale tail-shaped marine park that extends out into the ocean and can be seen during low tide. It's also a great spot to see whales and other marine life. This park needs to be protected from environmental degradation that comes with lack of wastewater treatment in order to maintain the marine life, and the

community's economy. The Bahia Ballena project was the focus of the 2016 student design competition. The design competition winners spent a large portion of time working with GWS members Alex Lober, Manuel de los Santos, and other GWS QA/QC committee members refining their design leading up to the trip this summer. All of the students were enthusiastic to visit the village they had spent several months staring at and assessing via Google Earth. They were all in agreement that it was much different than they had expected. Seeing greywater flowing through the ditches on the sides of the streets and into the estuaries, walking through the town and catching random whiffs of strong sewage odors, and discovering the enthusiasm from the community for this project invoked an even stronger passion for the cause and will to realize our goals.

The highlight of the trip for the Bahia Ballena project was a community meeting in which Manuel de los Santos presented the design plans to the Village residents and received an overwhelmingly positive response. GWS also spent a great deal of time working with Mauricio Vargas, the Director of the ASADA, and members from both AyA (the national government agency for water and wastewater management) and MINAE (the Costa Rican equivalent to the DNR). Fernando Vilchez and Laura Torres of AyA expressed that they support GWS' work and are helping to find funding and management of the proposed treatment systems.

As far as the engineering work goes, the plans have been completed by the students and GWS members will be submitted to RQL for review. However, GWS has run into land acquisition/use issues in this project as well. The location of the proposed project site was found to be a protected zone due to the nearby marine park, therefore developing this area is not permissible easily. This land is owned by a local developer, Franklin, who was planning on donating the land for the treatment facility but was unaware that it could not be used for any type of construction. Franklin, with the help of Amy Work of Geoporter and Travis Bays of Bohdi Surf (our local contacts) are hoping to work with MINAE to get the protection zone lifted based on the environmental benefit that would come from the building of the wastewater treatment plant. Additionally, we are gathering information on other potential sites for the facility that may require some redesign of the collection system. Mauricio has provided information on one parcel so

Dominical









far, and is looking into other properties. The students who have worked on the project for the design competition are eager to see this project through construction, and we look forward to their help and participation in the future endeavors of GWS.

More information about this project can be found in the Fall 2015 issue of *Central States Water*.

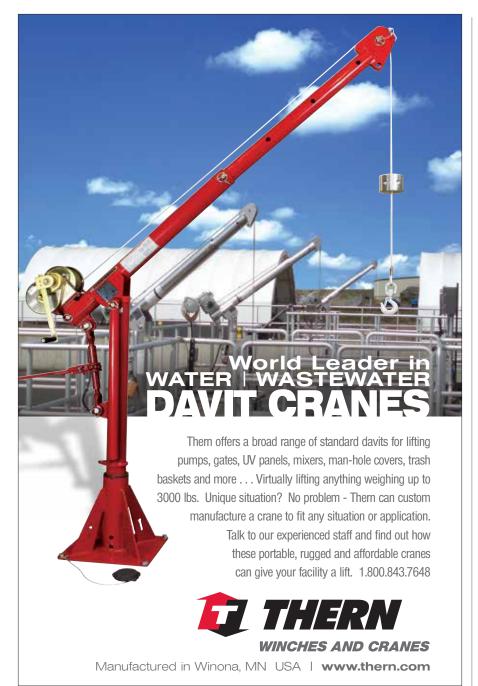
DOMINICAL

The newest GWS project will take place in Dominical, a small village just north of Bahia Ballena that is also dependent on tourism. This community is quickly being developed and requires better sanitation in order to keep up with the expected increase in population during the peak

tourism season. The sanitary conditions in Dominical are similar to both Piedras Blancas and Bahia Ballena.

The group met with a surveyor in Costa Rica to survey the village streets and help to scope out potential sites for construction. We also met with Trevor Yoder, an American developer who owns a large area in the village and is planning to put up a luxury eco-resort that will bring in tourists and help strengthen the economy. He is willing to work with GWS and has some potentially feasible sites that we could use. One parcel that was suggested is currently delineated as a wetland, but, similarly to the site in Bahia Ballena, could potentially be utilized for this purpose based on the environmental benefits the plant will present. Dominical





is presenting to be more of a challenge because of flooding and land value due to the proximity to the ocean. James Drews, another contact who is a Wisconsin native currently residing in Dominical, is working to find more information for potential sites. We also have received water usage data from AyA to begin developing our problem statement for the 2017 Student Design Competition that will be the basis for the Dominical Project.

OTHER PROJECTS

SAN ISIDRO

While in Costa Rica, AyA requested that the group inspect a facultative lagoon treatment system that is located in a community in the mountains called San Isidro. This system is one of very few centralized treatment systems in the country. It is functioning poorly and is a source of odors. It appears that it was sized for a much smaller population when designed. The influent pipe is fully submerged, even in dry weather. It is aerated through aspirators that are likely insufficient for the aeration required. AyA has provided GWS with engineering plans and data to continue evaluation and make recommendations to improve its functionality and effluent quality. GWS professionals will be evaluating the system and making recommendations along with cost proposals for required equipment, etc. We also hope to engage students at some of the universities that are involved in the design competition in the plant assessment and recommendations in order to get more students involved.

CONDOMINIUM PACKAGE PLANT

We also visited a newly constructed condominium development with a small package plant to treat wastewater before discharging to an estuary that leads to the ocean. These condos have been inhabited for more than six months. however, the plant has never been turned on due to lack of knowledge and training on the system. GWS was asked to help interpret the operation and maintenance manual and help to train the condominium staff on how to operate the plant. It was discovered upon turning on the plant that a cap is missing for the oil on one of the pumps, so it will not function until that is replaced. However, we were able to work with staff to help him understand what must be done on a regular basis with the plant for it to function properly.

EDUCATION

A large portion of this trip was spent working in local schools to educate children about the importance of clean water and GWS' mission. We believe that education is the foundation to the organization's success in any of the communities, therefore we strived to reach as many children as possible while we were there. In the end, this was very successful. We were able to

work with over 500 students ages K-12. The students were very engaged in the presentations and seemed to thoroughly enjoy our visit. Manuel de los Santos, Liz Bohne, and Amanda Heller presented to the students at five different schools in both Bahia Ballena and Dominical.

The presentation discussed the potential impacts of dirty water, what greywater and blackwater are, and what the current waste management methods in their specific communities are. We then discussed what wastewater treatment was, and why it's important. We also told them about different ways they could help us and help to protect the environment and their own health.

We finished with some activities where the students were able to visualize the spread of germs and the treatment of water through the use of glitter as contamination. They got to build their own water filters and see the difference between the contaminated water (the water with glitter) and the clean water passing through their filter and entering the ocean. They also received stickers, magnets, balloons, and a handout summarizing what we talked about to

bring home. Many expressed that they were excited to share what they learned with their families and that they wanted to put the stickers up in their bedroom. It was encouraging to see their enthusiasm and to know they will have a constant reminder of GWS, who we are and what we do posted in their homes and visible in their everyday lives.

LOCAL AND GOVERNMENT SUPPORT

To date, GWS has received nothing but positive feedback and support from the local government agencies in Costa Rica. Through our local contacts in Costa Rica (Amy Work with Geoporter, Travis Bays with Bodhi Surf and James Drews with Coldwell Banker Dominical) we were able to organize several meetings throughout the week that the group attended with both local and national governing personnel to promote our mission throughout the Osa Province. Many people were initially confused about our agenda, asking "What is in it for you guys?" and were surprised to discover that we were simply there as volunteers to help, with no hidden agenda.





Throughout these meetings the group met with the entire board of the Bahia Ballena ASADA, members from AyA, SINAC (Costa Rica National Conservation Organization), MINAE, and Costa Rica-USA Foundation (CRUSA). We also met with the engineers from RQL to discuss the next steps for the projects.

Laura Torres has created a list of sites where AyA believe that treatment facilities are necessary and hopes to work with GWS to push this forward. Fernando Vilchez also

has expressed willingness to help secure funding for future projects through the government, realizing that wastewater is a critical element towards improving the environment of Costa Rica and the health of its people.

This trip was a great learning experience for GWS as an organization. We are starting to more deeply understand the challenges we face and will be able to work more efficiently

and effectively on the next project in Domincal, as well as pushing forward with the initial Piedras Blancas project and the Bahia Ballena Project. We have become a known entity within the communities, and have developed a relationship with not only the authorities, but the residents of the communities that will be affected by the projects.

It has been a journey and will continue on, but we have a great group of passionate and enthusiastic volunteers working tirelessly for the success of these projects. GWS is working on raising funds to help cover some of the costs for the communities, as well as to pay the local surveyors, engineers, and other contacts for their work. We received an outstanding amount of support from CSWEA members in our fundraising push before the trip and we truly appreciate all the support. Pura Vida!

For more information about Global Water Stewardship and how you can help, we encourage you to check out our website at www.globalwaterstewardship.org, and follow us on Facebook, Twitter and Instagram (@H2Ostewards), connect with us on LinkedIn. CS

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UPDATE BY PAT OATES

The 2016 Central States Exchange (CSX) was held on July 21 & 22 at the Kalahari Resort in the Wisconsin Dells. CSX is a forum where members, section chairs and the executive team exchange ideas on how Central States can continue to best serve our members in a water environment that is changing at a very fast pace. It was a great to have members from all three states collaborate about the future of our industry and our association and it is always a pleasure to meet with everyone's families.

At the 2016 CSX we had valuable discussions revolving around many topics. We discussed improvements to our technical programs to keep them current and aligned with industry trends, improvements to the exhibits at the annual meeting and updates from the sections and delegates. We also had a lively discussion regarding the Global Water Stewardship and activities that have taken place to make this an independent and sustainable non-profit organization that delivers a valuable service to communities that need our help in getting sanitary facilities in their communities.

CSX concluded with updating our strategic plan, the metrics that will be used to measure our progress and goals that will determine if we have been successful.

CSX is open to all CSWEA members and we are already planning an interesting program for CSX 2017. CSX is an opportunity to help steer Central States in a direction that is beneficial to our members and we hope to see you there next year! CS













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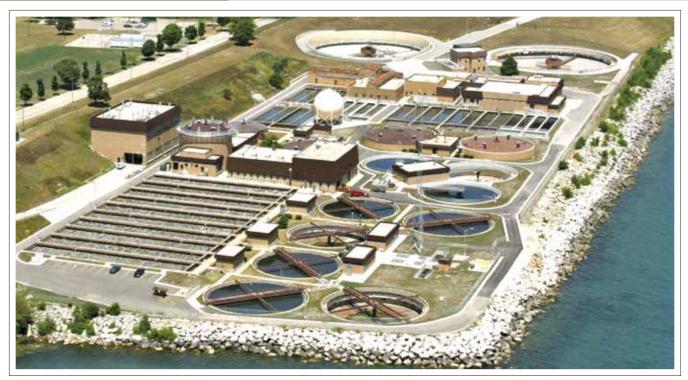












Present Day Aerial View of Racine Wastewater Treatment Plant

City of **Racine**Wastewater Treatment Plant

INTRODUCTION

Racine, Wisconsin. A Great City on a Great Lake. Racine is a true gem of a city with a large amount of lakefront access for its residents to enjoy. Today bike paths, marinas and stately homes border Lake Michigan in a medium-sized city that truly provides affordable lakefront access for all walks of life. At the turn of the century, this former industrial city had far from a beautiful lakefront to enjoy. It was a busy port city and industries bordered its shores as industry thrived. A study performed in 1913 by Chicago engineer John Alvord demonstrated that the Root River was a cesspool of bacteria with results off the chart (or Petri dish). People were getting sick and the city was growing at an alarming rate and the surrounding natural waterways could not keep up with the pollution. The price tag was tough to swallow, and then the country entered World War I followed by the Great Depression. Local politicians struggled to fund the necessary improvements. Thank goodness they did find the funding.

The following story discusses the evolution of wastewater treatment in Racine, WI.

1927

Racine's earliest efforts at wastewater treatment occurred in 1927, with the start of construction for a Root River interceptor, a Sixth Street pumping station, and a force main near the St. Paul Railroad. All of this was in place by 1931 at a total cost of about \$347,000. (The lift station and interceptor are still in use today)

In August of 1935, R.T. Reilly, a Chicago-based engineer, undertook a detailed study of Racine's water and sewage needs. Reilly noted that Racine had "a fine, new, up-to-date water treatment plant...furnishing pure, wholesome water." Reilly also observed that this community was "not lacking in a proper realization of its responsibilities" to neighboring cities in supplying adequate sewage treatment.

Simply diluting the sewage in Lake Michigan was no longer acceptable for Racine, concluded Reilly, because our drinking water and beaches were being polluted, the raw sewage was a general nuisance to those living near the beach, and we were failing to totally meet our obligations to other lakeshore cities.

Although some citizens continued to question the need to spend more money on a sewage plant, plans moved ahead to erect Racine's first large-scale sewage treatment facility off 21st Street. Alvord, Burdick and Hawson, a Chicago engineering firm, masterminded the construction plan.

1938

The new plant became operational on June 14, 1938, with a crew of 10 newly hired men reporting to Harly Boeke, the first plant superintendent. Roy Spencer was Mayor of Racine at the time.

Little fanfare accompanied the opening, which attracted nothing more than a five-inch article with a small headline on an inside page of the Journal Times.

According to that article, "All sewage from the Root River side, north side, south side and business district interceptors will not be pumped into the plant until the large tunnel designed to carry it is found to be in proper shape. In the meantime, some raw sewage is still being dumped into the lake and river near the Case plant."

A somewhat larger Journal Times headline of June 20, 1938 made this pronouncement: "New Plant Ends Lake Pollution." A subhead added, "All Raw Sewage Is Being Treated by Special Process." In the article which followed, then-Wastewater Commissioner Henry A. Nelson revealed that seven to eight million gallons of sewage now was being treated daily in the \$1.5-million plant.

The original treatment process was described: "As the raw sewage comes into the plant...it goes through grinders and then into grit chambers, where all material that cannot be digested is removed. Then it goes into clarifiers and to the digesters and next to the drying beds, all of which are under glass. The effluent, clear as drinking water, is all that goes into the lake. End of the effluent line is far out in the lake, so even this does not pollute Racine beaches."

Racine's first Wastewater Treatment Plant was originally designed to treat 12 million gallons of wastewater per day; the plant now receives nearly 20 million gallons per day (MGD), with a design flow of 36 MGD, and a peak flow of 308 MGD.

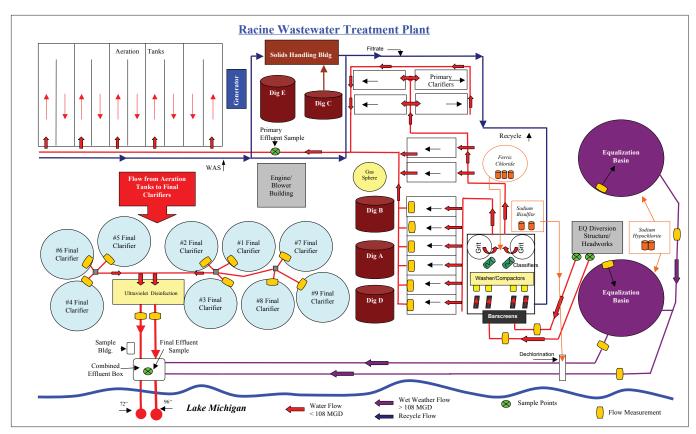
The original plant was a primary treatment installation. Wastewater was conveyed to the plant in a 72-inch diameter pipe and chlorinated, then passed through grinders known as comminutors that shredded the larger solids in the wastewater. Inorganic material was removed by a channeled grit removal system equipped with mechanical scrapers. Organic material was removed as biosolids from four primary settling tanks. The clarified liquid was then discharged directly to Lake Michigan and the biosolids were further treated in the anaerobic digesters. In the digesters, organisms acted to reduce the organic content of the biosolids. As part of this process, the organisms produce methane gas. From the beginning, this gas was harnessed and used in the plant to reduce energy costs. Although the original design was 12 MGD, it was found that the primary clarifiers were able to treat more flow during wet weather situations.

Boeke served as plant superintendent until January 1941 before giving way to Walter Schubert. The latter left the job after two months and was replaced by Tom Hay, who held the post until his retirement in January 1968.

1968

The 1938 plant was designed to provide primary level treatment for up to 12 million gallons of sewage per day. As the Racine area grew, however, so did its sewage problems and the plant's capacity was being strained. By the 1960s, the need for expansion was evident.

In 1968, with the aid of federal funds, a \$3.7-million expansion of the existing treatment site was undertaken. At that time William Beyer was mayor. Primary level treatment capacity was increased to 23 MGD and upgrades allowed for 12 million gallons of treated wastewater being sent from the settling tanks (primary clarifiers) to a pair of newly constructed aeration tanks where oxygen-activated bacteria (activated biosolids) in the secondary process further broke down the harmful constituents in the wastewater. From here the flow was conveyed to two final settling tanks (final clarifiers). Any amount over the 12 MGD capacity of the aeration tanks that was flowing from the primary clarifiers bypassed this stage of treatment and blended with the effluent from the



final clarifiers. Chlorine was then added to the wastewater, the flow passed through a chlorine contact tank (to give the chlorine time to work), and 30 minutes later was discharged through a 72-inch outfall extending 500 feet into Lake Michigan. Chlorine was applied to the wastewater to destroy any harmful bacteria that were still present in the wastewater.

A portion of the biological solids that settled in the final clarifiers were returned back to the aeration tanks to continue the secondary treatment process. The balance was pumped to the primary clarifiers where it became part of the biosolids that were pumped to the digesters. This was necessary because, like all organisms, the microbes in the aeration tanks reproduce and eventually there are too many of them to treat the wastewater at an optimal level.

SEWER SEPARATION

At approximately the same time as the 1968 plant expansion, Racine embarked on an ambitious program of sewer separation providing separate underground lines for sanitary sewer and storm runoff. The sanitary flow ended up at the treatment plant, the storm runoff in lakes or waterways.

Gary Coates was named plant superintendent in 1968, and later that year assumed the title of engineermanager. At that time Stan Budrys was named plant superintendent.

1970s

Not even the 1968 expansion would prove sufficient. By the early 1970s, with the city plant now processing sewage from Mount Pleasant and several other surrounding communities, further expansion was indicated.

In 1972, expansion plans and specifications were approved by the State's Department of Natural Resources, and bonding was approved by the Racine City Council. There were the inevitable delays, however, and construction was not completed until 1977.

What had started as a \$10-million expansion turned into a \$14-million project. In any event, it was the largest government construction project in Racine history up to that point.

As was the case with the 1968 expansion, federal dollars paid for about 75% of the project. These funds were cleared in 1973 when Racine was placed

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in the top one percent of the State's priority list for Environmental Protection Agency Funds.

Construction took 2.5 years and was under the direction of another Chicago engineering firm, Conser Townsend. This same firm had been responsible for the 1968 expansion.

These upgrades added flow capacity through the addition of upgraded screening, more primary clarifiers, additional aeration tanks and digesters for biosolids treatment. Additionally, more final clarifiers were added after the aeration tanks and before chlorination to allow for secondary treatment of all of the flow from the plant.

Dedication of the new Wastewater Treatment Plant occurred on November 13, 1977, during the reign of Mayor Stephen Olsen. This upgraded plant made it possible to treat 30 million gallons of sewage per day through all processes. The hydraulic capacity of the plant was increased to 70 million gallons per day provided that 40 million gallons of the flow did not pass through the secondary process. The inability to treat all of the flow biologically was not a problem and the two flow trains were blended and chlorinated before being discharged to Lake Michigan.

The new addition also provided for chemical addition to the flow stream that enabled reduction of the amount of phosphorus discharged to the lake.

SINGLE UTILITY

Another key development of the 1970s was the merger of the city's water department and sewage divisions into a single Water and Wastewater Utility. Previously, they had operated individually with Wastewater being a division of the Public Works Department under Commissioner Fred Larson.

Les Hoganson followed Coates in 1977 as general manager of the new Utility, with Thomas White succeeding Hoganson in 1986.

1989

In the late 1980s, it was clear that while the plant was able to treat the normal everyday flows without problems, capacity was strained and often exceeded when there was rainfall or runoff from melting snow.

The Utility undertook another large project, that of adding a Flow











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Equalization Basin (EQ) at the beginning of the plant, before screening. This EQ basin allowed the plant staff to change gates in use and valving and divert flow to the EQ basin. The tank has a capacity of 2.7 MG. The influent flow to the tank is chlorinated using strong liquid bleach. This tank is more than a holding tank, when it is full; the flow overflows from the tank. This EQ effluent is then treated with another chemical to remove the chlorine. The flow then blends with the effluent from the plant and is discharged into Lake Michigan. The use of this tank, allowed the plant to treat higher wet weather flows without causing a washing out of the microorganisms in the secondary process.

During the same time that the EQ basin was constructed, a change was made to the plant process to allow dechlorination of the plant effluent. At this time, chlorine was still added to the effluent to remove pathogens, but because chlorine was a hazard for some of the organisms in the lake, it was necessary to remove the chlorine before discharging into the lake.

2002

In the spring of 2002, the communities of Racine, Mount Pleasant, Caledonia, Sturtevant and respective sewer utilities of those communities signed a landmark agreement to provide for additional capacity at the Racine Wastewater Treatment Plant. The Village of Wind Point signed the agreement in February 2003. The signing of the "Racine Area

Intergovernmental Sanitary Sewer Service, Revenue-Sharing, Cooperation and Settlement Agreement" paved the way for expansion of the treatment plant. The resulting project expanded the Utility's ability to handle average day flow as well as wet weather flow at the plant and in the collection system. The cost of this expansion was approximately \$85 million. The expansion is expected to provide plant capacity until the year 2020.

This expansion was completed in 2005. The expansion provided the ability to treat an average flow of 36 MGD, with a peak flow of 108 MGD through the plant itself. With the addition of a second EQ basin, the plant is able to treat a peak flow of 308 MGD, with 200 MGD of this through the EQ basins.

The most current upgrade, provided for addition of or improvement to many of the processes at the plant. Major additions included another EQ basin, a new screening building, additional primary clarifiers, the addition of an anaerobic digester, more final clarifiers, a new solids handling building, upgrades to plant power, and the addition of UV Irradiation that allowed the Utility to eliminate the use of gaseous chlorine.

DESCRIPTION OF PLANT PROCESSES TODAY

The Racine Wastewater Treatment Plant is a conventional activated biosolids plant with chemical phosphorus precipitation, separate biosolids digestion, belt filter

press dewatering and ultraviolet disinfection of effluent.

FLOW EQUALIZATION BASINS

The Racine Wastewater Treatment Plant flow equalization basins are designed to reduce flow to the treatment plant during periods of high influent flow. Flows exceeding 108 MGD (million gallons per day) will be directed to the flow equalization basins. Wastewater stored in the flow equalization basins is reintroduced into the normal wastewater stream at the option of the operator. Influent wastewater which is directed to the basin can be chlorinated. This will provide odor control for stored wastewater and disinfection for any amount that overflows the basins.

Prior to entering the equalization basins, wastewater is screened by mechanically cleaned bar screens. Wastewater in the basins is returned to the treatment flow scheme by gravity and by pumping. It can be returned to the headworks for full treatment, the aeration basins for secondary treatment, or to the digesters for biosolids handling. Both equalization basins are 200 feet in diameter and have a storage capacity of 2.7 million gallons each. The second equalization basin was completed in June of 2003.

FLOW

The wastewater flow enters the headworks of the plant through an 84- and a 72-inch diameter line. The design average flow is 36 MGD. From the headworks junction chamber, two 54-inch diameter pipes direct the flow into the preliminary treatment building.

MECHANICALLY CLEANED BAR SCREENS AND WASHING PRESSES

The preliminary treatment building contains four bar screens each with a rated maximum capacity of 35 MGD. The bar spacing between screen elements is one-half inch. Coarse sewage material is captured and removed from the flow to prevent plugging of pumps and unnecessary wear on downstream equipment. Each bar screen has a washing press to reduce organic content, moisture content, and volume of screenings.





VORTEX GRIT REMOVAL EQUIPMENT

Two vortex grit removal units rated at 70 MGD each remove coarse abrasive inorganic material continuously from the screened wastewater flow.

GRIT CONCENTRATORS

Two grit concentrators remove water and organics from the material pumped to them from the vortex grit removal system.

PRIMARY CHANNEL BLOWERS

Two Hoffman blowers (100 horsepower) with a capacity of 2500 CFM. These blowers keep suspended solids in suspension until the flow reaches the primary clarifiers.

CHEMICAL FEED AND STORAGE FOR PHOSPHORUS REMOVAL

Phosphorus must be removed from wastewater to eliminate a major source of the primary element required for the growth of algae in Lake Michigan. Three 12,000-gallon fiberglass tanks store ferric chloride which is used to form insoluble ferric phosphates with the soluble phosphates in the raw wastewater. Total storage capacity equals 36,000 gallons.

PRIMARY CLARIFIERS

There are a total of 12 primary clarifiers. Six clarifiers are considered west bank and the other six east bank clarifiers. Four west bank clarifiers are 34.5 feet wide by 137.5 feet long and 10.5 feet deep. The other two west bank clarifiers are 122 feet long by 28 feet wide by 10.5 feet deep. The east bank of primary clarifiers has four clarifiers 120 feet long by 38 feet wide and 8 feet deep. The other two east bank clarifiers are 128 long by 30 feet wide by 10.5 feet deep. Total primary clarifier capacity is 3.7 million gallons. Average detention time in the primary



clarifiers is 3.6 hours at 25 MGD. Mechanical scrapers push biosolids to sumps for removal to digesters. The scrapers also push scum to troughs for removal. The scum is then pumped into the digesters.

ANAEROBIC DIGESTERS

The plant has four-1-million gallon capacity digesters. Biosolids from the primary clarifiers is pumped to these digesters. Mechanical mixers and heat exchangers for heating are provided. Temperature is maintained at 95F. Through anaerobic bacterial action, biosolids are decomposed and converted into a more stable product. Methane gas is produced as a by-product of this decomposition. This gas is used as a fuel supply for engines and boilers.

HOLDING TANK

The plant has one holding tank with a volume of 552,000 gallons. After primary digestion, biosolids are transferred to the secondary digester. Digested solids



are removed from this digester and pumped to the belt filter press operation for dewatering.

GAS STORAGE SPHERE

The gas produced in the digesters as a by-product of the digestion process consists mainly of methane and carbon dioxide. It is used as fuel for the engine driven blowers and in the boilers for building and biosolids heating. Since gas production is not uniform in rate, a gas storage sphere is provided for storage of gas produced at rates in excess of usage. Stored gas is removed and used during periods when demand is greater than production. The sphere is 40 feet in diameter, providing storage at 50 psi for 200,000 cubic feet of digester gas. If gas production exceeds capacity, it is flared off with an automatic gas flare.

AERATION TANKS

The aeration tanks are two pass tanks, each pass measuring (in feet) 168 by 30 by 15. The total volume of five



aeration tanks equals 5.65 million gallons. The Racine Wastewater Treatment Plant retrofit the five existing aeration tanks with fine bubble diffusers in the fall of 1991.

AERATION CONTROL BUILDINGS

These buildings house the controls for the pumps and equipment involved with the aeration system.

AIR BLOWERS

Three Engine-Driven Blowers:

#2 Engine and Blower

- Engine: 426 horsepower Blower Capacity: 9,600 CFM at 8.5 psig

#3 Engine and Blower

- Engine: 675 horsepower Blower capacity: 15,000 CFM at 8.5 psig

#5 Engine and Blower

- Engine: 426 horsepower Blower Capacity: 9,600 CFM at 8.5 psig

Two Motor-Driven Blowers:

#1 Motor horsepower: 500 Blower Capacity: 11,000 CFM at 7.5 psig

#4 Motor horsepower: 311 Blower Capacity: 6,900 CFM

at 8.5 psig

All air for the low-pressure system is filtered by a combination electrostatic and mechanical air filter. Accessory equipment includes silencers on air intake and discharge for each blower, and combination silencers and heat recovery units on the engine exhausts. Heat is recovered from engines by circulating the engine jacket water through heat exchangers in the building and biosolids heating system. The engines can be operated on biogas produced by the treatment plant or natural gas.

FINAL CLARIFIERS

Nine Clarifiers: Three 85 feet in diameter; three 90 feet in diameter and three 93 feet in diameter. Total volume equals 5,360,000 gallons. Detention time is 5.1 hours at 25 MGD. The plant has the ability to waste solids to the GBT or to the primary clarifiers, although wasting to the primary clarifier rarely happens. All final clarifiers are rim feed design to aid in the settling process. The clarified water or secondary plant effluent is conveyed to the U.V. disinfection process.

U.V. AND SODIUM HYPOCHLORITE DISINFECTION

Two UV systems are provided at the Racine facility. Ultraviolet light is used to provide disinfection of final clarifier effluent and a hypochlorite system is used to provide disinfection of wastewater diverted to the flow equalization basins.

The hypochlorite system is used to service the flow equalization facility. Chlorination is provided for odor control of wastewater temporarily stored in the equalization basins and for disinfection of wastewater which may overflow the equalization basins. Chlorination is provided at the equalization basin bar screen effluent channel and at the lift station force main discharae structure. Hypochlorite application to the RAS system is also provided. Sodium hypochlorite is stored in two tanks located in the liquid chlorine building. Liquid hypochlorite solution is delivered to the various points of application by chemical feed pumps located in the liquid chlorine building. The hypochlorite feed pumps are flow paced.

DECHLORINATION SYSTEM

Sodium bisulfite is used for dechlorination at the wastewater treatment facility. Liquid sodium bisulfite is stored in one tank located in the preliminary treatment building. Bisulfite is transferred to the point of application by chemical metering pumps and enters the equalization basins' effluent through diffusers. Dechlorination of equalization basin effluent is provided at the dechlorination structure located downstream from the two equalization basins. For dechlorination of equalization basin effluent, the bisulfite pump is flow paced.

NINETY-SIX AND SEVENTY-TWO-INCH DIAMETER OUTFALLS

Two outfall lines 72-inch and 96-inch, extend 500 feet out into the lake. There are three 48-inch openings at the end of each pipe for discharge purposes. The 96-inch line was added in early 2003.

BELT FILTER PRESSES

Six two-meter presses. The continuous stage belt filter presses consist of two polyester cloth belt sets one above

another that maneuver through a series of pressure rollers. Biosolids are conditioned with a liquid polymer and are fed onto a gravity drainage section of the belts. Following gravity drainage, the biosolids are distributed on the lower pressure belt. After an additional small section of gravity drainage, the concentrated biosolids come in contact with the upper belt. The two belts form a wedge which gradually forces removal of water. The water removed (filtrate) is collected in drainage pans and combined with gravity drainage water and recycled back to the head of the plant. Pressure is increased as the belts pass through rollers of decreasing size. The final three rollers form an S-shaped configuration which generates a shear force and creates additional water drainage. Dewatered biosolids are hauled by truck to ultimate disposal. The filter belts are continuously washed with water at high pressure.

GRAVITY BELT THICKENERS

The gravity belt thickeners (2) are used to dewater waste activated biosolids (WAS) from the Secondary Activated Biosolids treatment process. Polymer is added to the WAS to help the dewatering process. Thickened WAS is pumped to the digesters.

FINAL EFFLUENT SYSTEM

Three final effluent pumps are located in the aeration pipe gallery. Final effluent is pumped to the yard hydrants and street hydrants. There are also two cooling water pumps installed in the aeration pipe gallery to pump screened final effluent to the engine jacket water cooling heat exchangers.

One F.E. Pump:

200 gpm at 243-foot head.
One Cooling Water Pump:
550 gpm at 55-foot head.
One Auxiliary Engine:
(use at time of power failure)
Pump: 550 gpm at 50-foot head.

TANK DRAINAGE SYSTEM

The tank drainage system consists of the drain system for all the treatment units and the bypassing arrangements for these units. Two tank drainage wells and five drainage pumps are provided.

Five Tank Drainage Pumps: 700 gpm at 30-foot TDH.

PIPE GALLERY

The pipe gallery is the connection between the primary plant and the secondary plant. All necessary systems run through the pipe gallery.

PLANT WATER SYSTEM

This system provides a physical break between the incoming city water and the plant water distribution system.

HVAC

Hot water for space heating is provided by one continuous loop system. The system is provided with four multiple pass, horizontal fire tube boilers with five square feet of heating surface per rated boiler horsepower. Two of the four units can be fired by biogas or natural gas. Air circulation systems have been installed for space heating and cooling, odor control, and removal of dangerous gases. At critical areas or areas where air handling units are not installed, unit heaters are provided to heat the space, and exhaust fans with separate air intake louvers provide ventilation.

EMERGENCY GENERATOR

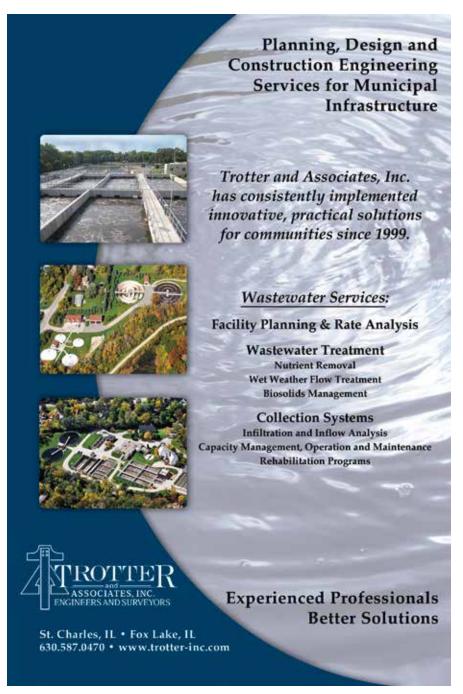
The Wastewater Treatment Plant has an emergency generator that can operate the plant independently of WE Energies. In the event of a power failure, the plant will continue to function and maintain permit limits. The generator has a capacity of 2000 kW.

As well as serving the City of Racine, the plant now accepts flow from Mount Pleasant, Caledonia, North Bay, Sturtevant, Wind Point and Elmwood Park.

The plant and staff will continue to be tasked with finding ways to provide the best quality effluent in order to protect our Great Lakes. The Department of Natural Resources is proceeding with new water quality standards (as required by the Clean Water Act and overseen by the United States EPA) that require diligent change and adaptation by the plant staff.

This is just another step in the evolution of wastewater treatment in Racine and the rest of the nation. The control of water pollution in whatever form it takes will continue to be the goal of the Racine Wastewater Utility for the next 50 years and beyond.





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PHOSPHORUS JAR TESTING

BY MARK B. VAN WEELDEN, RUEKERT & MIELKE, INC





BACKGROUND

This article summarizes the jar testing study conducted by staff at the Village of Sussex Wastewater Pollution Control Facility (WPCF) as a part of their Operational Evaluation Report submitted to the Wisconsin Department of Natural Resources (WDNR) on September 8, 2015.

The Village of Sussex uses an extended aeration oxidation ditch secondary treatment process. Unit processes include screening, influent pumping, grit removal, aeration, final clarification, tertiary filtration with anthracite filters, and UV disinfection. The regional WPCF serves the Village of Sussex, the Town of Lisbon Sanitary District No. 1, the Village of Lannon and a portion of the Village of Menomonee Falls. The average influent flow of the WPCF is 1.7 MGD and the average influent total phosphorus (TP) concentration is 3.7 mg/L, yielding approximately 69 lb/day TP. The average effluent TP concentration is 0.45 mg/L. Phosphorus removal at the Sussex WPCF is accomplished through biological processes in the oxidation ditch and chemical treatment. Most of the phosphorus removal is accomplished through chemical precipitation. The Village uses ferric chloride which is introduced to the process in the inner channel of the oxidation ditch. The basic reaction for the precipitation of phosphorus with iron-based chemicals is as follows:

$$Fe^{3+} + H_aPO_4^{3-n} \longleftrightarrow FePO_4 + nH^+$$

We see that 1 mole of iron will precipitate 1 mole of phosphorus; however, the actual removal rate tends to be lower than this theoretical amount due to a number of factors including competing reactions, pH, alkalinity, and trace elements found in the wastewater. In light of the complexity of the actual reactions occurring in wastewater applications, dosages at treatment facilities are generally established on the basis of

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bench-scale tests, such as jar testing, in conjunction with trial-and-error methodology at treatment facility scale. For the purposes setting up experimental bench-scale dosages, a removal efficiency of 1.5 mole of Fe³⁺ per mole of P was assumed (Metcalf & Eddy, 2003).

The chemical formula of ferric chloride used at the Sussex WPCF is FeCl₃ which gives a molar mass of 162.2 g/mole. The ferric chloride is supplied in solution at 37-45% strength and a density of 1.432 kg/L. A solution strength of 38% was assumed for this study.

The purpose of this jar testing study was to determine the reaction efficiency of the ferric chloride the Village currently uses with respect to influent phosphorus levels. The determination of this reaction efficiency curve shed light on the maximum potential for chemical precipitation at the Sussex WPCF and also showed ways that the Village staff could optimize its use. Jar testing does not take into account the effect of biological phosphorus removal (BPR) that occurs in the treatment process at the Sussex WPCF. However, the results of the jar testing experiment demonstrated the approximate level of BPR occurring in the oxidation ditch by comparing the results obtained by jar testing raw wastewater with the plantscale phosphorus removal.

THEORETICAL CHEMICAL DOSAGE CALCULATIONS

In order to approximate the theoretical dosage to treat an average influent phosphorus level, the following assumptions were made based on 2014 treatment facility information:

Average Influent Flow = 1.73 MGD

Average Influent P Concentration = 3.66 mg/L

Average Influent P Loading = 52.84 lb/day

The theoretical dosage was then calculated to be 28.8 mg/L FeCl₃, or 91.4 gallons per day. It is important to note this value is the theoretical dose to remove 100% of the P assuming a removal efficiency of 1.5 moles of Fe³⁺ per mole of P. In reality, only 90-95% of this value is necessary to reduce P levels to the 0.3-1.0 mg/L range (approximately 26.5 mg/L or 85 gallons per day). In addition, previous dosing studies conducted at the Village of Sussex WPCF have shown that biological phosphorus removal that occurs in the oxidation ditch is a significant component of the overall phosphorus removal at the plant level. Considering this biological component, the actual removal occurring in the oxidation ditch is notably more efficient than the theoretical value. This disparity was accounted for when selecting dosage levels for the jar testing experiment. Unfortunately, biological removal cannot be simulated in a jar testing study, so this component of the phosphorus removal occurring at the WPCF is relegated to the discussion portion of this study.

Research has shown that removal efficiencies for a target effluent phosphorus level in the range of 0.3-1.0 mg/L can vary from 1.2 to 4.0 moles of Fe³⁺ per

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FIGURE 1 – Jar Testing Experimental Setup



FIGURE 2 – Jar Testing Experimental Setup (Stock Solution Adjacent to Sample)



FIGURE 3 – Side-by-Side Comparison of Jars with Increasing Doses



mole of P when considering chemical precipitation alone (Minnesota Pollution Control Agency, 2006). In general, the efficiency of coagulation in wastewater applications falls as the concentration of the pollutant of interest decreases. In theory, then, the jar testing results will generate a curve that approaches a high efficiency limit as the amount of phosphorus removed is maximized. Another important note is that the removal of phosphorus with ferric chloride is sensitive to the pH of the removal environment. The optimal pH for phosphorus removal with iron salts is approximately 6.5 to 7.5 (Minnesota Pollution Control Agency, 2006).

EXPERIMENTAL SETUP

Based on the theoretical calculations, seven different dosages were determined to be tested surrounding the calculated theoretical value – 10, 15, 20, 25, 30, 35, and 40 mg/L. These dosages are weighted towards the lower end of the theoretical dosage to better reflect actual dosage levels used at the treatment facility. An additional blank was run to establish the pH and P concentration of the raw wastewater tested.

A 1.0% ferric stock solution was prepared by diluting 18.4 mL of the ferric solution to 1000 mL in a volumetric flask. Using this solution, each of the 1000 mL beakers were dosed with stock solution according to the following table:

TABLE 1 – Jar Dosage Rates (per 1000 mL raw sample)

4	1 7
Jar 1	Blank
Jar 2	10 mg/L (~30 gal/d plant scale)
Jar 3	15 mg/L (~45 gal/d plant scale)
Jar 4	20 mg/L (~63 gal/d plant scale)
Jar 5	25 mg/L (~80 gal/d plant scale)
Jar 6	30 mg/L (~95 gal/d plant scale)
Jar 7	35 mg/L (~110 gal/d plant scale)
Jar 8	40 mg/L (~127 gal/d plant scale)

A single grab sample was taken from the treatment facility influent stream for use in the study. Jars were tested four at a time using four separate magnetic stir plates (see Figures 1 and 2). The jars were gently stirred for one hour and then allowed to settle for one hour to roughly simulate the oxidation ditch and clarification processes at the Sussex WPCF. After settling, observations of each sample were recorded, and the supernatant was sampled and tested for pH and total phosphorus concentration. Figures 3 and 4 illustrate examples of jars during the settling time. There was a notable increase in clarity and sludge blanket depth corresponding to the increased dosage in each sample. A total of 16 samples were run in four sets (the dosing sequence shown in Table 1 was repeated for the second set of eight jars).

RESULTS AND DISCUSSION

Table 2, Table 3, Figure 3, and Figure 4 summarize the results of the jar testing study conducted at the Sussex WPCF.

There were several lessons the Village staff learned from this study that may be helpful for future trials and overall plant operation. First, while the results show anticipated curve patterns, there was still some uncertainty evident in the data. If future jar testing trials are to be conducted, Village staff could identify ways in which experimental error could be reduced in order to acquire more reliable data. Applications include rigorous mixing of the wastewater prior to pouring each sample and careful extraction of the supernatant (note the difference in TP concentration between the two blanks used as a baseline for the test). Another way to minimize error would be for the same operator to run all of the phosphorus tests in the same day. In this case, two different operators split the samples over a span of two days for TP testing.

One specific example of uncertainty in the data is the two points at the bottom

of the curve in Figure 5. For both sets of samples, there was a minimum TP level that both curves approached at higher dosage rates (approximately 0.75 mg/L). The results from dosage levels of about 25 mg/L to 35 mg/L seemed to have stabilized at this minimum. However, the final dosage level in the first set of samples achieved a lower TP value than the apparent minimum, adding uncertainty to the conclusion that the apparent minimum value is truly the minimum limit for chemical precipitation in the trial.

Despite the uncertainty in the experimentation, there are a couple of conclusions that can be drawn from the study. There is a clear asymptotic trend in both graphs illustrating a limit to efficiency of the chemical reaction that precipitates phosphorus. This information can potentially be important in understanding how effective additional chemical addition can be in attaining low effluent phosphorus levels at plant scale. The removal efficiencies shown in Figure 6 are within the anticipated range of values cited in the discussion above, typically remaining in the 1.3-3.0 mol Fe³⁺/mol P range. This result suggests that the ferric chloride is performing up to expectations, and that the only improvement in chemical precipitation efficiency would be in the use of more efficient chemical coagulants. However, since the Village doses at a level of approximately 17 mg/L (50-60 gallons/ day), Figure 6 illustrates that there is still ample "room" in the curve (between efficiencies of 1.5-2.5) for efficient chemical phosphorus precipitation.

This concept has been illustrated to be true in a couple of instances at the Sussex WPCF. First, the WPCF staff conducted a plant-scale ferric chloride dosing study from December 2012-May 2013. The results of that study are illustrated below in Figure 7. The graph illustrates

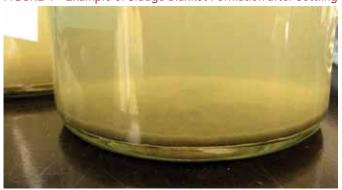
TABLE 2 – Jar Testing Results Summarized

Sample #	Ferric Dose (mL)	Ferric Dose (mg/L)	Fe ³⁺ Dose (mg/L)	Fe ³⁺ Dose (mol/L)	Supernat. TP (mg/L)	TP Removed (mg/L)	TP Removed (mol/L)	TP Removal (%)	Removal Efficiency
1	0	0	0.00	0.00E+00	3.28	0.00	0.00E+00	0.0%	0.0
5	1	10	3.44	6.17E-05	2.26	1.02	3.29E-05	31.1%	1.9
2	1.5	15	5.16	9.25E-05	1.80	1.48	4.78E-05	45.1%	1.9
6	2	20	6.89	1.23E-04	0.96	2.32	7.49E-05	70.7%	1.6
3	2.5	25	8.61	1.54E-04	0.78	2.50	8.07E-05	76.2%	1.9
7	3	30	10.33	1.85E-04	0.77	2.51	8.10E-05	76.5%	2.3
4	3.5	35	12.05	2.16E-04	0.76	2.52	8.14E-05	76.8%	2.7
8	4	40	13.77	2.47E-04	0.52	2.76	8.91E-05	84.1%	2.8
9	0	0	0.00	0.00E+00	2.81	0.47	1.52E-05	14.3%	0.0
10	1	10	3.44	6.17E-05	1.88	1.40	4.52E-05	42.7%	1.4
11	1.5	15	5.16	9.25E-05	1.46	1.82	5.88E-05	55.5%	1.6
12	2	20	6.89	1.23E-04	1.18	2.10	6.78E-05	64.0%	1.8
13	2.5	25	8.61	1.54E-04	0.85	2.43	7.85E-05	74.1%	2.0
14	3	30	10.33	1.85E-04	0.81	2.47	7.98E-05	75.3%	2.3
15	3.5	35	12.05	2.16E-04	0.81	2.47	7.98E-05	75.3%	2.7
16	4	40	13.77	2.47E-04	0.75	2.53	8.17E-05	77.1%	3.0

TABLE 3 – Jar Testing Results Summarized (pH)

Sample #	рН	Sample #	рН
1	7.03	9	7.23
2	7.10	10	7.24
3	7.23	11	7.28
4	7.30	12	7.34
5	7.32	13	7.21
6	7.07	14	7.22
7	7.02	15	7.26
8	7.01	16	7.25

FIGURE 4 – Example of Sludge Blanket Formation after Settling



that the current dosing level of about 50-60 gallons per day resulted in an effluent TP level of about 0.5-0.6 mg/L (close to the current plant average). However, the study showed that ramping up the chemical dosage to a level of 60-70 gallons per day can lead to significant drops in effluent TP concentration down to about 0.2 mg/L. This point was again confirmed in July 2015 when a feed pump went out of service. When the operators discovered the failure, they injected a large slug of ferric chloride into the oxidation ditch to avoid a violation. The result of this large dose (on the order of 70-80 gallon per day) was an effluent TP concentration of under 0.1 mg/L. This potential for additional chemical precipitation may need to be utilized in the Village's future phosphorus compliance efforts.

The current ferric chloride dosing rate used at the WPCF gives a corresponding jar testing value of about 1.5 mg/L in Figure 5. Interestingly, this value is substantially higher than the Village's average effluent P level in 2014 of 0.45 mg/L. This difference between the levels attained in the jar test and at plant scale suggests that the BPR achieved in the oxidation ditch plays a significant role in the overall phosphorus removal. As an illustration, the jar testing results can be used in conjunction with WPCF data to partition TP removal into chemical, biological and physical removal processes. If it is assumed that the tertiary filters remove approximately 10 mg/L TSS from the waste stream (based on current WPCF data), and that TSS contains approximately 3% TP, this means that the filters remove about

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Supernatant TP Level after Mixing and Settling vs. Ferric Chloride Dosage Level

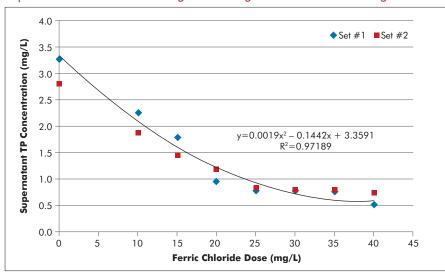


FIGURE 6 - Phosphorus Removal Efficiency (mol Fe3+/mol P) vs. Ferric Chloride Dose Level

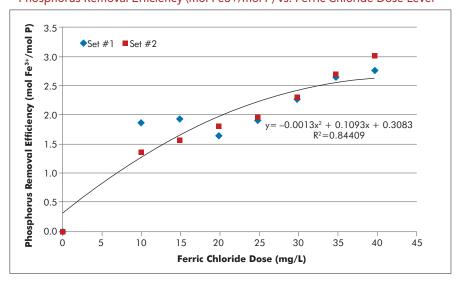
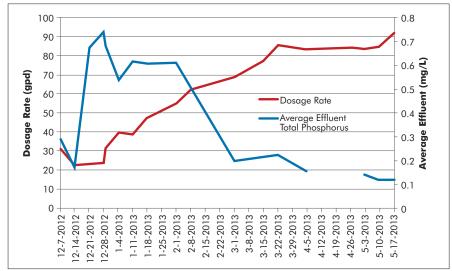


FIGURE 7 -Summary of Results from the Village of Sussex WPCF Ferric Chloride Dosing Trial



4.3 lb TP/day assuming the 2014 average flow of 1.7 MGD. If it is assumed that the jar testing results are reflective of plant scale removal, chemical precipitation accounts for approximately:

$$(3.0-1.5 \text{ mg/L})*8.34*1.7 \text{ MGD} = 21.6 \text{ lb TP/day}$$

Finally, if chemical precipitation gets the influent concentration down to about 1.5 mg/L and the tertiary filters gets the concentration down to about 1.2 mg/L, BPR accounts for the remaining portion (assuming an average effluent concentration of 0.45 mg/L):

$$(1.2-0.45 \text{mg/L})*8.34*1.7 \text{ MGD} = 10.8 \text{ lb P/day}$$

This exercise results in 59%, 29%, and 12% removal rates for chemical, biological, and tertiary filtration processes, respectfully. This approximate distribution of phosphorus removal will be important to consider as strategies are formulated for future phosphorus compliance.

The results of this preliminary jar test are helpful for a couple of reasons. First, it has been shown that jar testing can lead to a better understanding of the dose-response relationship for the wastewater introduced to the Sussex WPCF. This knowledge suggests that there is still potential for more chemical phosphorus removal in the future. In addition, this study has illustrated the approximate distribution of phosphorus removal mechanisms at the Sussex WPCF between chemical, biological, and physical processes. In light of the relatively simple and inexpensive nature of jar testing, it has been recommended that the Sussex WPCF staff conduct additional tests at varied dosage levels to augment the current data set. Additional testing may lead to a better understanding of TP removal processes at their facility as they seek to achieve phosphorus compliance.

RESOURCES

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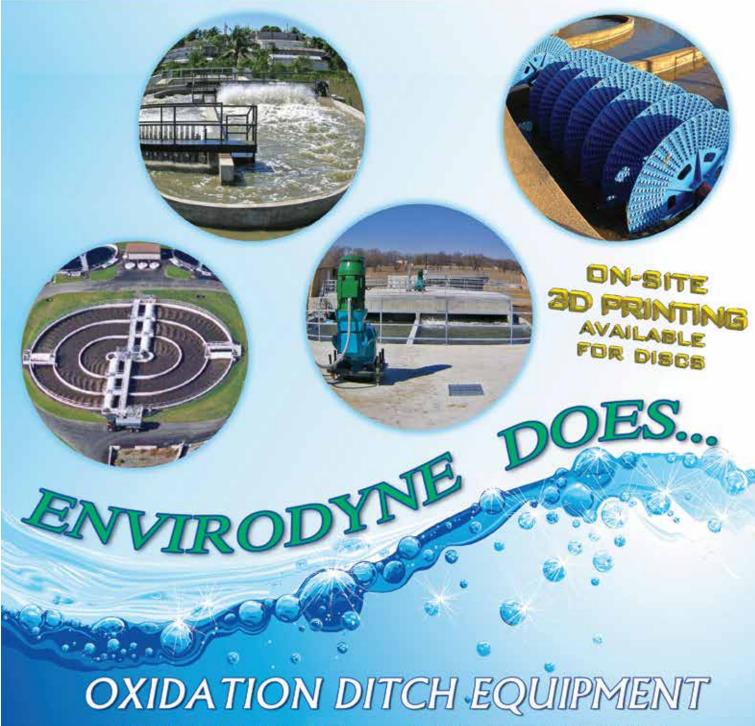
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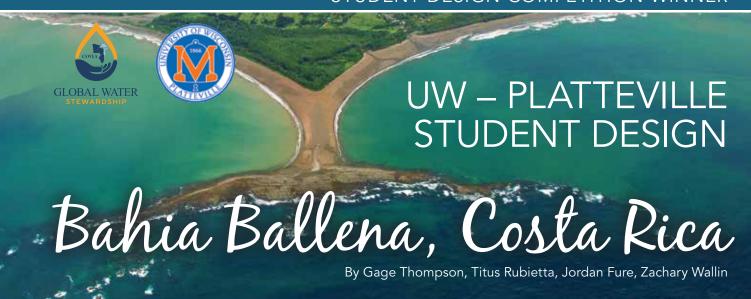
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View of Bahia Ballena

civil engineering senior design team from the University of Wisconsin – Platteville took their winning wastewater facility and collection system design to a small community in Costa Rica this August. The project was presented on behalf of the Global Water Stewardship Design Competition given to the students through their senior design project before graduating. Team members of the senior design group include Gage Thompson, Zachary Wallin, Titus Rubietta, and Jordan Fure, all of whom are graduating seniors in civil and environmental engineering.

The project location is Bahia Ballena, a tourist community of around 1000 people. Bahia Ballena is located in the southern portion of Costa Rica, adjacent to the Pacific Ocean. Like many rural areas of Costa Rica, there is no centralized wastewater treatment, Instead, each individual property treats their wastewater through the use of septic systems. This presents many problems for the community, including health, safety, and high costs of maintenance. With population growth expected to greatly increase in the next 10 years, planned future developments, and the popularity from tourism, a change in the way they handle wastewater was necessary.

The design process consisted of preliminary investigations of population growth and projected flows. Being a tourist community, flows had to be adjusted for peak times of the year in which a large

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influx of tourists could affect treatment needs. The next step was to select a site for the facility. There were three potential sites that were suggested. Of the three potential sites provided, a site on the north end of a retired airstrip was selected.

This site allowed for adequate space for the 30-year design and potential for expandability. Additionally, the site is furthest away from the densely populated areas, which reduced the potential for odor issues. The site was already owned by the municipality, unlike the other potential sites. Because the airstrip was not frequently used, the opportunity cost of using the land for a wastewater treatment plant was low. All of these factors and many other criteria went into a site selection matrix which was then used to compare the sites. The airstrip was ranked highest. After these initial decisions were made, design of the facility and collection system could begin.

The facility that would be designed, like any other project, had criteria that needed to be met. It had to be simple to run and maintain, and also to be relatively self-sufficient as a full-time staff was not possible. The system also had to treat high concentrations of BOD and TSS (biochemical oxygen demand and total suspended solids) due to low flows. This led to multiple preliminary designs being considered so that the most effective facility could be chosen. One of those designs used aerated lagoons. Lagoons were inexpensive to construct, and easy to maintain, but needed large tracts of



From left: Gage Thompson, Jordan Fure, Zachary Wallin, Titus Rubietta

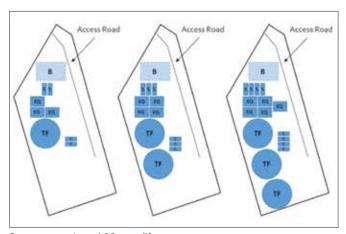
land to size them appropriately. They would also require large amounts of electricity to aerate. As a result, they were deemed non-feasible. Another design considered was a traditional activated sludge system. These systems are very common and have very high treatment efficiency. They also have small footprints compared to lagoons. However, they are too complex and costly for a community such as Bahia Ballena. Ultimately the facility needed to fit somewhere in between. In the end, a trickling filter system was selected as the best of both processes. Trickling filters have small footprints, require little to no electricity which means low upkeep costs, are relatively simple to operate and maintain, and are effective at treating high concentrations especially in the warmer climates. The system would also include primary clarification through settling tanks, a pump controlled equalization basin to handle the large diurnal flow, a trickling filter to treat the wastewater, and final clarification.

The facility was also designed in phases to eliminate high capital costs, and to allow for more accurate upgrades as needed to eliminate the potential of either over

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Overview of collection system layout and facility site location



Startup to projected 30-year life.

designing or under designing the facility. A small facility building to house equipment and an access road were also considered necessary to appropriately size the site.

The collection system was also an important part of the design. The system included a gravity sewer, a lift station, and force main. The lift station was necessary to lift the wastewater to the north end of the

airstrip due to the elevation difference. The collection system was also divided into two phases. The first phase concentrated on the southwestern portion of Bahia Ballena. This was the densest location of homes and businesses in the community. The second phase would then continue east and reach the remaining populace and future developments. The system was also

designed to handle a potential expansion to the north from another small community.

All in all, the design competition was

All in all, the design competition was very enjoyable and a great way to gain experience in real world engineering problem solving. The team enjoyed going down to Bahia Ballena this August with the Global Water Stewardship to help startup and assist with the beginning of the project. We also look forward to collaborations with another student design project that will be presented at WEFTEC in New Orleans later this fall. CS



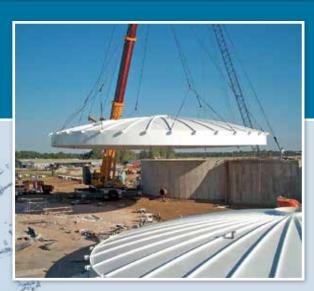


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Finding Strength in Numbers

The Water Advocates website makes it easier to get involved in water-related legislation and regulations

By Steve Dye, WEF Government Affairs



The Water Environment Federation (WEF; Alexandria, Va.) has launched a new website and on-line grassroots advocacy tool for the Water Advocates program that features important legislative and regulatory matters and calls-to-action on issues impacting the water sector.

The website offers a number of free grassroots tools to help WEF members engage with their elected officials. Although the website is accessible to all water professionals, WEF invites members to join the Water Advocates program to increase their effectiveness in advocating for the water sector. WEF members can join the Water Advocates community on wefcom.org, as well as the Water Advocates website.

Automated Letter Writing to Congress

The Water Advocates website currently has two calls-to-action on significant bills pending in Congress that connect users to a "Write your Congressman" tool on the website. The tool electronically submits pre-drafted letters to Senators and Representatives. The tool uses the official Congressional correspondence process so the emailed letter will not get marked as spam.

The first call-to-action urges the House and Senate to increase funding for water infrastructure in FY2017 appropriations bills. The letter asks Congress to fund the Clean Water and Drinking Water State Revolving Fund (SRF) programs at \$2 billion each. In addition, the letter includes a link to a new report by WEF and the WateReuse Association that states that for every \$1 million in SRF funding, \$930,000 is returned to the federal treasury in tax revenues, 16.5 high-paying jobs are created, and \$2.95 million in economic growth is generated in the U.S. economy.

The second call-to-action urges the Senate to pass the Water Resources Development Act of 2016 (WRDA). The Senate version

of this bill includes a number of important policy and funding provisions that benefit water infrastructure investment. The bill was passed out of committee earlier this year, but now needs to go to the Senate floor. The draft letter asks senators to urge Senate Majority Leader McConnell to bring the WRDA bill to the floor and pass it with the water infrastructure provisions.

Grassroots Advocacy Toolkit

Members and Member Associations have another toolkit for their grassroots advocacy efforts. This toolkit explains the benefits of grassroots advocacy at the federal, state, and local levels, and provides advice and guidance on how to engage with elected officials and the public on important issues affecting the water sector. The toolkit outlines essential steps to grassroots advocacy, as well as provides quick tips on calling, writing, and meeting with elected officials. Also, the toolkit includes useful links to Congressional and federal agency websites and directories.

WEF members can download the PDF version of the toolkit at the Water Advocates website. Member Associations are urged to share it with members as a resource.

Author's Note

Since 2011 Steve Dye has served as Legislative Director for the Water Environment Federation (WEF). In his government relations role Steve represents the Federation before Congress, monitors key legislation and federal policies, develops and executes legislative strategies and proposals, and maintains WEF's excellent reputations before public and private interests in the water sector. He also leads WEF's Water Advocates Program, a grassroots program designed to mobilize and train WEF members to advocate before federal, state, and local officials.

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WaterWeek 2017

Mark your calendars!

WaterWeek 2017 is happening in Washington, D.C., on March 20-25, 2017. At WaterWeek, the National Water Policy Forum, Fly-In, and Expo will be hosted by WEF, NACWA, WE&RF, and WateReuse from Tuesday, March 21, through Thursday, March 23. Other partner organizations such as AWWA and WWEMA are also hosting their annual fly-ins the same week.







Big Data Making Waves in Utility and Investment Communities



By Barry Liner, Ph.D., P.E.

Smart water infrastructure and big data are starting to attract funding both from investors and utilities after years of capturing the water sector's imagination. Automated Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) have been around for decades, but improved sensors, advanced analytics, and visualization tools are now enabling utilities to better partner and interact with their customers.

Smart water infrastructure technology has the potential to reform delivery of services while raising the quality of life by helping to make cities more sustainable and resilient. The smart city movement encompasses many facets, such as smart buildings, energy management, transportation connectivity, information connectivity high speed data networks, and, of course, water management.

Opportunities from smart city programs are exciting to contemplate, but two factors really serve as the primary drivers for a city or community to implement smart city initiatives — achieving cost efficiency and sustainability. In terms of actual implementation, water utilities trail natural gas and electric utilities in the implementation of smart initiatives. About a third of all natural gas utilities and one quarter of all electric utilities report being engaged in a smart city initiative, while only 15 percent of water utilities claim to be.

While smart water practices are increasing in adoption, the barriers to implementation in the water sector are generally well known and include siloed communication within the utility and between infrastructure sectors, the need to justify ROI, lack of budget, and lack of resources and expertise. Additionally, at the municipal level, sometimes short-term, high-visibility smart infrastructure projects such as street lights, digital kiosks, and electric vehicle charging systems may gain funding approval more easily than water-related initiatives. Master planning efforts to integrate water, energy, communications, and transportation systems are complex and come with a longer time horizon, which might make them comparatively more difficult for decision makers.

Opportunities abound, however, such as the potential of cloud-based platforms to facilitate implementation of these big data solutions at utilities of all sizes. Small investments in hardware and software are required for cloud-based computing which aligns well with resource constraints of small and medium-sized utilities.

Utilities implementing smart water practices must consider six key aspects of a big data platform: integration, analytics, visualization, development, workload optimization, and security and governance. Integration is critical to have one

platform managing the data, as separate silos of data only create separate silos of insight. An integrated solution has to be bigger than one technology. Analytics tools are used to analyze the data, providing more sophisticated, accurate, and actionable information. Visualization tools bring the information into a form that is understandable by decision makers, be they utility managers, government officials, or customers. Development tools are needed to enhance the analytical and visualization engines as well as support the overall platform. Workload optimization focuses on efficient processing and storage of the data. Security and governance are critical for maintaining the sensitive data that must be protected, which is especially important for public sector agencies including many water utilities.

As more and more utilities implement smart water practices, the opportunities to harness big data are growing rapidly. In March 2016, Imagine H2O announced the winners of its Water Data Challenge competition. These innovative startup companies provide an indicator of the momentum toward providing big data solutions. While water and many other resources have been called "the new oil," big data has earned this cliché moniker for nearly a decade as well. The big data analogy to oil is quite appropriate since oil has little value in its raw form, but when refined, it can power the world. The same can be said of big data. The water sector has a huge amount of data, but that data must be refined into information to spur utilities and customers to knowingly take action.

Sensors are one of the biggest sources of big data, and the water sector is particularly rich in sensor data. Smart metering, inventory management and asset tracking, fleet management, SCADA systems, and water quality instrumentation are major sources of sensor data.

The Nutrient Sensor Challenge exemplifies one effort to advance sensor technology. The Challenge is an innovation effort to accelerate the market for the development, adoption, and use of sensors to measure nitrate and orthophosphate in water. The goal is to encourage development of sensors that are affordable (less than US\$5,000 purchase price), reliable (unattended operation for 3 months), and can provide accurate real-time data. The Challenge, which seeks to accelerate these new technologies to commercial availability by 2017, is being sponsored by Alliance for Coastal Technologies (ACT). ACT is a partnership of research institutions, state and regional resource managers, and private sector companies, supported by US National Oceanic and Atmospheric Administration (NOAA) and

Environmental Protection Agency funding, whose purpose is to develop, improve, and apply sensor technologies to study and monitor coastal environments.

Private investment from venture capital firms are helping companies that provide solutions associated with many aspects of big data platforms to advance at a rapid rate. For example, XPV Water Partners (Canada), one of the world's leading institutional water funds, counts the US firm FATHOM as one of their portfolio companies. Based in Phoenix, Arizona, FATHOM is a software-as-a-service, cloud-based, geospatial data integration platform helping to enable water utilities of all sizes to unlock the power of their meter and customer data in order to increase revenue, decrease costs, and delight customers. Emerald Technology Ventures (Switzerland) recently invested in Optimatics, an Australian firm providing infrastructure planning software that uses genetic algorithms to optimize capital investment for water and wastewater utilities.

Imagine H2O, a global water innovation accelerator, conducts water infrastructure challenges that produce companies advancing technologies for analytics, sensors, and visualization. From the analytics arena, 2015 winner Valor Water (San Francisco, California, USA) provides customer sales analytics software to water utilities to address revenue risk, affordability, and supply management. Finalists included FLOWatch (Wynnewood, Pennsylvania, USA), which provides integrated asset management software for water and environmental systems operators, and Dropcountr (Redwood City, California, USA), who uses data analytics and mobile apps to communicate water usage and metrics to consumers and utility staff. On the topic of sensors, finalist Lumense (Atlanta, Georgia, USA) is developing a real-time, continuous sensor platform for monitoring chemicals and biologicals in water, while fellow finalist Aquarius Spectrum (Israel) features a near real-time, automatic water pipe monitoring tool for leak detection based on acoustic sensing.

Like Imagine H2O, The BREW accelerator program at the Water Council in Milwaukee, Wisconsin, USA has seen an increase in big data-related participants from the city. The most recent class included Optiktechnik, which makes laser-based, optical sensors and instrumentation to improve monitoring and control of key particle processes in water and wastewater treatment. Radom creates instrumentation to identify toxic trace metals in water, wastewater, industrial processes, and food

and drugs. Current Data is a watershed-focused water quality data collection and information system using a sensor array and mobile app with cloud storage and analysis tools to lower the costs of data collection and increase its use in critical water quality decisions. In the BREW's inaugural class, Meter Hero focused on water consumption data and social networking to drive conservation programs.

Drinking water and wastewater are not the only categories of water sector advances in big data. On the groundwater front, Wellntel, provides a real-time understanding of well and surrounding water table dynamics, provided through constant measuring and reporting of water levels. Both Imagine H2O and the Water Council's BREW program recognized this firm for its innovation. Managing stormwater in real time is the focus of both EmNet and OptiRTC, while companies like H2Ometrics provide cloud-based visualization tools to better plan stormwater and sewer operations.

Cloud-based solutions provided by innovators will help water utilities of all sizes advance smart water infrastructure. Smart water innovation has even emerged from firms better known for other IT sectors such as network giant CISCO or mobile devices leader Qualcomm. With innovations developed by entrepreneurial startups and large companies including IBM, GE, and OSIsoft, an exciting future is already underway for big data solutions in smart water infrastructure.

Author's Note

Barry Liner is the director of the Water Science & Engineering Center at the Water Environment Federation (WEF).

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



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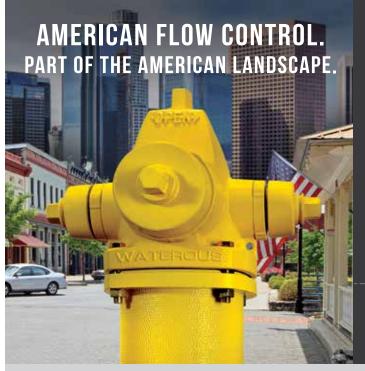
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Our role in protecting the public and the environment are often undervalued and invisible to the very public that we protect. Whether in design, academia, equipment manufacture and supply, management, or operations, we all know individuals who have successfully addressed unique and challenging issues. Our awards program offers the opportunity to receive recognition for these deserving professionals.

A top priority of CSWEA each year is to recognize the efforts of our members and water and wastewater professionals at all levels. We also seek to provide top-quality nominees to the Water Environment Federation (WEF) each year for national level recognition. It's time to brag a little bit about the accomplishments of our members. To nominate someone is straightforward: fill out the nomination form online with as much information as possible and submit it to CSWEA.

In order for you or a deserving colleague to be recognized, please submit a nomination to the Central States Water Environment Association and/or WEF for one of the many awards available.

Below is a listing of the award opportunities. Please carefully review

the various awards available and nominate one of our many deserving members. Please note that award submittals need to be made by November 14, 2016 for Awards presented by CSWEA to allow distribution to the respective CSWEA or WEF Awards Committees for consideration. CSWEA will present the winners with their awards at the 90th Annual Meeting Awards Banquet in May 2017, at the Intercontinental Riverside in St. Paul, MN. WEF awards will be presented at WEFTEC 2017 in Chicago.

2017 CSWEA & WEF Award nominations now being accepted

Nominations are now being accepted for the following WEF awards and should you be aware of a worthy nominee we ask that you please complete and return the bottom portion of this page for consideration. Note that it is OK to self-nominate. Each award is briefly described below and complete information may be found on the www.CSWEA.org or www.WEF.org websites.

WEF AWARDS presented at CSWEA Awards Banquet Arthur Sidney Bedell Award:

The Bedell is a Federation award that is given annually to one recipient in recognition of outstanding achievement in the sewerage and wastewater treatment works field, as related particularly to the problems and activities of the Member Association. The Bedell award subcommittee selects the nominations, and the award is presented at the CSWEA Annual Meeting.

William D. Hatfield Award:

The Hatfield Award is a Federation award given annually to one recipient in recognition of outstanding operation of a wastewater treatment plant. Each State Section may nominate one person per year and submit it to the Hatfield subcommittee. This award is presented at the CSWEA Annual Meeting.

George W. Burke Safety Award:

The Burke Award is made annually by WEF to a municipal or industrial wastewater facility for promoting an active and effective safety program. Each State Section Committee can nominate a facility and the nominations are then sent to the general awards committee. The winner will be presented with the Burke Safety Award at the CSWEA Annual Meeting.

Lab Analyst Excellence Award:

This is a WEF award that is given annually to one recipient in recognition of outstanding achievement in the area of water quality analysis. Each State Section Laboratory Committee may nominate one person. This award is presented at the CSWEA Annual Meeting.

CSWEA AWARDS presented at CSWEA Awards Banquet

Radebaugh Award:

The Radebaugh Award is given to the author of a deserving paper presented at the previous year's annual meeting. The Radebaugh award subcommittee selects the winner from nominations received and the award is presented at the CSWEA Annual Meeting.

Operations Award:

The Operations Award is a Central States award that is given annually to one recipient in each state. The purpose of this award is to recognize operators of waste- water treatment facilities who are performing their duties in and outstanding manner and our demonstrating distinguished professionalism. The States Sections' Committee makes the selection and each State Section winner will receive the award at the CSWEA Annual Meeting.

Industrial Environmental Achievement Award:

The award is given at the CSWEA Annual Meeting to one industry per year in recognition of outstanding contributions in waste mini- mization, pollution prevention, environmental compliance and environmental stewardship.

Each State Section Industrial Committee may nominate one facility per year.

Bill Boyle Educator of the Year Award:

This award is given to one teacher per year in recognition of outstanding education assistance to students of any level in the study of the water environment. The award is presented at the CSWEA Annual Meeting.

Collection System Award:

This award is given annually to one member from each section in recognition of outstanding contributions in advancing collection system knowledge and direct or indirect improvement in water quality. Each State Section Collection System Committee can nominate one individual per year with the selected candidate receiving the award at the CSWEA Annual Meeting. The recipient of the Association Award shall be nominated annually for the WEF Collection System Award.

CSWEA Outstanding Young Professional Award:

This award is given to one member in each state recognizing the contributions of young water environment professionals for significant contributions to CSWEA and to the wastewater collection and treatment industry at the CSWEA Annual Meeting.

Academic Excellence Award:

The Academic Excellence Award is given to one student per year from each eligible institution in the state section hosting the Annual Conference. (Illinois is hosting the next conference.) An eligible institution shall be a college or university having a recognized graduate or undergraduate program in engineering as accredited by the Accreditation Board for Engineering and Technology. The candidate shall be selected by the Department Chairman or other designated person at the eligible institution. Selected candidates are able to attend the CSWEA Annual Meeting with expenses paid, to receive their award and scholarship.

Central State Section Safety Award:

The CSWEA Facility Safety Award is made annually by CSWEA to a municipal or industrial wastewater facility within each State Section in recognition of active and effective safety programs from Burke Award submissions and the awards are presented at the CSWEA Annual Meeting.

Water Stewardship Award:

This award recognizes and honors the contributions of an individual for outstanding humanitarian service to improving and sustaining our global water environment. This award is presented at the CSWEA annual meeting.

WEF AWARDS presented at WEFTEC Charles Alvin Emerson Medal:

This award is presented by WEF to an individual whose contributions to the wastewater collection and treatment industry most deserve recognition.

Areas of involvement include membership growth, water resource protection, improved techniques of wastewater treatment and fundamental research.

Harry E. Schlenz Medal:

This award is presented by WEF and recognizes the achievements of an individual outside of the water environment profession, who takes up the banner of environmental public education. This person is typically in the journalism, film or video production field.

Richard S. Englebrecht International Activities Service Award:

This award is presented by WEF and recognizes sustained and significant contributions to the furtherance and improvement of the activities of the Water Environment Federation in the international field.

Outstanding Achievement in Water Quality Improvement Award:

This award is presented by WEF and CSWEA to the water quality improvement program that best demonstrates significant, lasting and measurable excellence in water quality improvement or in prevention of water quality degradation in a region, basin or water body.

Gordon Maskew Fair Medal:

This award is presented by WEF and recognizes worthy accomplishments in the training and development of future sanitary engineers. Nominee must be a WEF member.

Public Education Awards:

There are three categories of Public Education Awards: Individual, Member Association and Other. The awards are presented by WEF and recognize significant accomplishments in promoting awareness and understanding of water environment issues among the general public, through the development and implementation of public education programs.

George Bradley Gascoigne Medal:

This award is presented by WEF to the author(s) of an article, which presents the solution of an important and complicated operational problem within a full-scale, operating wastewater treatment plant, which is appropriately staffed. Article must have been published in a federation or member association magazine/newsletter during the previous year.

Thomas R. Camp Medal:

This award is presented by WEF to a member who demonstrates a unique application of basic research or fundamental principles through the design or development of a wastewater collection or treatment system.

The Phillip F. Morgan Medal:

The Morgan Medal is awarded by WEF and recognizes valuable contribution to the in-plant study and solution of an operational problem. A published paper is not required.

The George J. Schroepfer Medal:

The Schroepfer Medal is awarded by WEF and recognizes a professional engineer for conceiving and directing the design of a project to achieve substantial cost savings or economic benefit over other alternatives, while achieving environmental objectives.

Member Association Safety Award:

This WEF award is presented to a member association to recognize the success of the safety programs in their local wastewater works. (S

Nominate for awards at www.cswea.org/awards.













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CALL FOR ABSTRACTS

90th ANNUAL MEETING

MAY 22-25, 2017 | ST. PAUL, MN

This is a request for abstracts of papers to be considered for presentation at the 90th Annual Meeting of the Central States Water Environment Association, Inc., which will be held May 22-25, 2017 at the Intercontinental Riverside (pka Crowne Plaza), St. Paul, Minnesota. To receive consideration, abstracts must be submitted online before Wednesday November 23, 2016.

The theme for 2017 is *Utilities of* the *Future*. We are seeking speakers and abstracts covering new and innovative ways to use and recover materials, nutrients, and energy at wastewater plants!

The popular operations and utility management track will continue. Papers on troubleshooting, efficiency, optimization studies, case studies, and completed projects are of high interest. In addition to the operations and utility management track, there will be a separate **Operations Focus Session** covering topics related to day-to-day wastewater operations.

This year's conference will also feature sessions on soft skills/leadership to provide options for attendees looking to hone their interpersonal, management and communication skills.

Two hours of ethics training, as required by WI and MN Professional Engineer Certification Requirements, will be added to the program as well for those engineers that require this to maintain their license.

Papers on other subjects which you feel may be of interest to members are, of course, also welcome. All written papers submitted are eligible for the Radebaugh Award.

OPERATIONS and MAINTENANCE:

- Efficiency (pumps, motors, lights, UV disinfection, HVAC, etc.)
- Technology/SCADA/Web-based Maintenance Programs/GIS Applications
- Troubleshooting
- Case Studies
- Summary of Completed Projects
- Optimization

- Nutrient Removal
- Process Control
- Start-up Issues

UTILITY MANAGEMENT:

- Succession Planning
- Project Funding
- Utility Rate Development and Reviews
- Employee Retention
- Communication

ENHANCED RESOURCE and ENERGY RECOVERY

- Resource Recovery Raw Materials, Nutrients, Energy
- Digester Gas Production Technologies
- Co-digestion
- Heat Recovery Technologies
- Alternative Energy Use

COLLECTION SYSTEMS

- Collection System Rehabilitation Technologies/Methods
- CMOM Program Development and Implementation
- Collection System Design and Operation
- Green Infrastructure
 - Examples in Practice
- Infiltration/Inflow Management
- Stormwater and Combined Sewer Overflow Management

RESEARCH and DESIGN

- Nutrient Removal Technologies
- New/Innovative Technology Research and Application
- Sustainability in Design and Construction
- Toxics/Emerging Pollutants Monitoring and Control
- Treatment Design
- Wastewater Reuse, Applications, Technology and Regulatory Issues

RESIDUALS, SOLIDS and BIOSOLIDS

- Environmental Management Systems
- National Biosolids Partnership
- Standard or Advanced Treatment and Stabilization

WATERSHEDS and STORMWATER MANAGEMENT

- Anti-Degradation and Other Regulatory Issues
- Habitat or Groundwater Protection or Restoration
- Non-Point Pollution Source Modeling
- Water Quality Trading and Watershed Management Issues and Initiatives, including Adaptive Management
- Green Infrastructure Solutions and Best Management Practices
- Total Maximum Daily Loads Involving Point and Non-Point Sources
- Education and Outreach

GENERAL

- Laboratory Issues/Bench-Scale Studies
- Pretreatment, Industrial Treatment, and Pollution Prevention
- Regulatory Issues
- Security Issues
- Engineering Ethics Training

SOFT SKILLS/LEADERSHIP

- Leadership skills
- Managing the III or Injured Employee
- Anti-Harassment and Discrimination Training for Managers
- Getting the Most Out of Employee Performance Evaluations
- We Negotiated the Agreement
 Now What?
- Handling the Grievance and Arbitration Process
- Managing in a Union Environment
- The Basics of Labor Law
- 10 Things Every Manager Should Know About Labor Law
- Top 10 Employment Law Issues
- Stumbling into Violations:
 Do Handbooks and Policies Violate Labor Law?
- Management Rights for Managers
- Social Media and the Workplace

To receive consideration, please submit your abstract via the online submittal process that can be accessed from the

CSWEA website. Please note the online form will be different than last year.

To submit your abstract, please go to www.cswea.org and then to the 90th Annual Meeting Abstract Submittal area. Please contact me with any questions or problems that you encounter. Thank you.

Andy Bradshaw

Chair, Technical Program Committee City of Moorhead

Wastewater Operations Manager

500 Center Ave

Moorhead, MN 56561 Phone: 218-299-5385 Email: andy.bradshaw@ ci.moorhead.mn.us

INSTRUCTIONS FOR THE SUBMISSION OF ABSTRACTS & CRITERIA FOR PAPER SELECTION

The Central States Water Environment Association (CSWEA) Technical program Committee has the responsibility for technical sessions at the Annual Meeting. Participants in any sector of the water environment field are cordially invited to submit abstracts for evaluation. The basis for selection will be the excellence of the abstracts as judged by the committee.

The abstract should be submitted online at www.cswea.org. Through the online submittal process, you will enter the title and abstract, import your credentials, choose your topic area, and select your

presentation format. Abstracts should summarize the talk in about 250 words and must be less than one page single-spaced, or two pages double-spaced using standard fonts and margins (about 500 words). The total number of abstract pages, including all tables and figures, must not exceed six (6) pages.

The presenting author of each abstract will be notified in February of the acceptance or rejection of the abstract.

The following should serve as a guide in the preparation of the abstract and will serve as a guide for the reviewers of the abstracts.

Originality and status of subject:

The paper should deal with new concepts or with new and novel applications of established concepts. It also may describe substantial improvements of existing theories or present significant data in support or extension of those theories. Studies of incomplete or ill-defined problem situations should be avoided. Previously published data should be introduced only in summary form and for comparative or supportive purposes.

Technical content: A summary of the conditions under which data were obtained should be presented along with the methodology used. The conclusions should be presented in the abstract and should follow directly from the investigation or evaluation that was conducted. The abstract should substantiate that the project has been fully developed, that the theory or experimental procedure has been firmly established, and that data have been collected and subjected to analysis. It should be evident that the abstract clearly describes the entire content of the conclusions of the paper to be presented.

Water environment significance:

The paper should relate clearly and significantly to the water environment field. Papers of a truly fundamental scientific nature are desired, but the author should make evident the relationships of the work to a practical problem area or situation in water quality and wastewater control.

Adequacy of abstract preparation:

The committee has noted that historically the adequacy of an abstract is often indicative of the quality of the final paper. As a result, authors are urged to prepare their abstracts with care, following the instructions noted above. As a reminder, an abstract is meant to summarize the presentation. The summary should include objectives, scope, and general procedures, insofar as the limited length of the abstract permits. An indication of results or conclusions is required.

ABSTRACTS ARE DUE BEFORE NOVEMBER 23, 2016.





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2016 OPERATIONS CHALLENGE

EFTEC 2016 and the Operations Challenge (OC) are only a few weeks away, but preparations for the OC teams started in early May. This year Central States WEA will put forth two teams; one team with four veterans and one team with a veteran leading three new team members. The two teams are made up of Central States award winners or wastewater professionals from facilities that the award winners are employed. The teams will have practice sessions in late August and early September. Both practices will take place at the City of Janesville Wastewater Treatment Facility; thank you to Joe Zakovec and the crew at Janesville for their hospitality and training that the teams will receive. During the first practice, team members will gather for the first time and start the process

of getting to know each other. One of the goals of this practice is to forge new friendships, find common interests, and build a well-oiled, cohesive team. Some of the team members new to the Operations Challenge have never met, some will have traveled hundreds of miles, but all will bring enthusiasm and a desire to make this a great experience. The first practice is a time to look at the strengths and interests of each person, this helps the coaches in assigning event tasks that need to be divided amongst all team members for the five events. As in past years the events are: Process Control, Laboratory, Maintenance, Collections, and Safety. During both practice sessions team members will be given practice exams in preparation for the process control exam, they will hone their skills in the laboratory event, build endurance so they can hand cut 8-inch

PVC pipe as fast as possible for the collections event, discuss and practice all required tasks for the pump maintenance event, and refine their skills for a confined space rescue in the safety event.

2016 TEAMS MEMBERS:

Pumpers:

- Captain Marc Zimmerman
 - City of Janesville, WI
- Autumn Fisher
 - City of Fond Du Lac, WI
- Luke Markko
 - Village of Wauconda, IL
- Zach Matyja RJN Group, IL
- Coach Tom Dickson
 - City of Oconomowoc, WI.

Shovelers:

- Captain Chris Lefebvre
 - City of Stevens Point, WI
- Chris Kleist City of Duluth, MN
- Jason Neighbors
 - Glenbard Wastewater Authority, IL
- Matt Streicher
 - Glenbard Wastewater Authority, IL
- Coach Jim Miller
 - Wenck Associates, MN.

The team members put a lot of time and effort into the practices and training at home for the Operations Challenge and with your support and encouragement the teams will perform as champions. If you are going to be in New Orleans for WEFTEC 2016 and you have an opportunity, please help cheer on the CSWEA Operations Challenge teams.

Also, if you would like to become a team sponsor please contact Todd Sheridan at todd@nmwrd.org for more information.

Thank you, Todd Sheridan





Save the date

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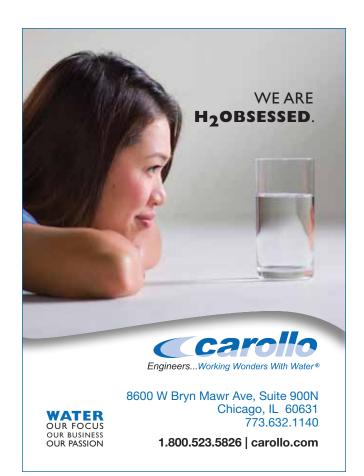


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2016 CSWEA

BUYERS' GUIDE







Welcome to the annual Central States Water Buyers' Guide. When making purchasing decisions about products and services in the wastewater industry throughout the Central States region, please support the companies whose advertising makes Central States Water possible.

OUR CSWEA BUYERS' GUIDE CONSISTS OF TWO SECTIONS:

- 1. A categorical listing of products and services, including a list of companies which provide them.
- 2. An alphabetical listing of the companies appearing in the first section. This listing includes name, contact info, website, and more.

LISTINGS BY CATEGORY

Activated Carbon

CEI Carbon Enterprises Inc.

AMI/AMR

Sensus

Anaerobic Digestion

JDV Equipment Corp. Olympus

Architecture

McMahon

Biogas Treatment

Unison Solutions

Chemical Processing & Feed Systems

Crane Engineering Energenecs Force Flow

Chlorine and Chemical Tank Scales

Force Flow

CIPP Rehab

LMK

Clarifiers/Thickeners

Kusters Water

Coagulants & Flocculants

Kemira

Coatings, Lining & **Corrosion Control**

Bolton & Menk, Inc. Process Equipment Repair Services SpectraShield Liner Systems

Construction Castings

HD Supply Waterworks

Contractors

Engineering America Environmental **Dynamics International** Process Equipment Repair Services

CSO/SSO Controls, Water Resources, **Distribution & Collection**

AECOM Burns & McDonnell CDM Smith Inc. Clark Dietz Donohue & Associates, Inc. Engineered Pump Hydro International

LMK University of Wisconsin-Madison

Diffused Aeration Systems

Sanitaire

Education & Training

University of Wisconsin-Madison

Electrical, Instrumentation/ Controls/Generators

Baxter & Woodman, Inc. Clark Dietz Donohue & Associates, Inc. Energenecs **Engineered Pump** Gasvoda Associates IW Allen Smith & Loveless Xvlem

Engineers/Consultants

Advanced Engineering and Environmental Services, Inc. **AECOM**

Baxter & Woodman, Inc.

Black & Veatch

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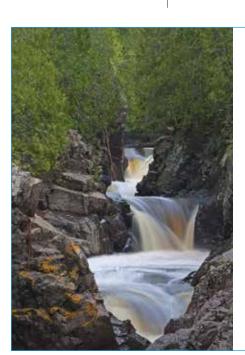
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General Industrial

Power Lube Thern Winches and Cranes

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Advanced Engineering and Environmental Services, Inc. Baxter & Woodman, Inc. Bolton & Menk, Inc. Crawford Murphy & Tilly, Inc. McMahon RHMG Engineers Inc. Ruekert & Mielke, Inc. Trotter and Associates Inc.

Grit Removal Systems

Hydro International Smith & Loveless Inc.

Lagoons, Aeration

Environmental **Dynamics International**

Leak Detection

ME Simpson

Lubrication

Power Lube

Maintenance

Thern Winches and Cranes

Manhole Covers & Frames

HD Supply Waterworks Thern Winches and Cranes

Manhole Rehab

LMK Technologies SpectraShield Liner Systems

Meter Reading Systems

Environmental

Dynamics International HD Supply Waterworks

Meters/Meter Testing

HD Supply Waterworks M.E. Simpson Co., Inc. Sensus

Mixing

Medora

Odor Control Solutions

Evoqua Kemira Kusters LAI, Ltd. Medora

Operation Services

Baxter & Woodman, Inc. Engineered Pump Environmental

Dynamics International Sensus

Pipe & Appurtenances

Brown and Caldwell Foth

Pipe Repair

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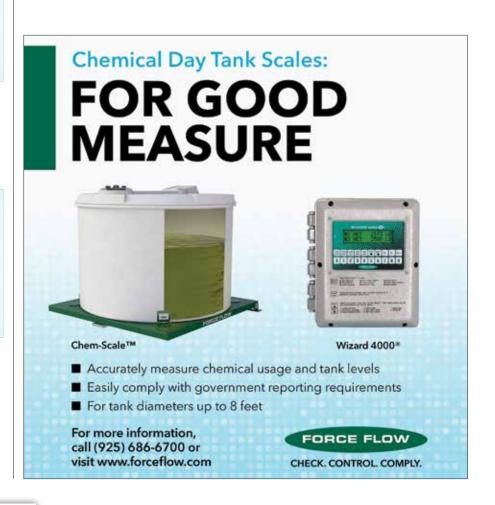
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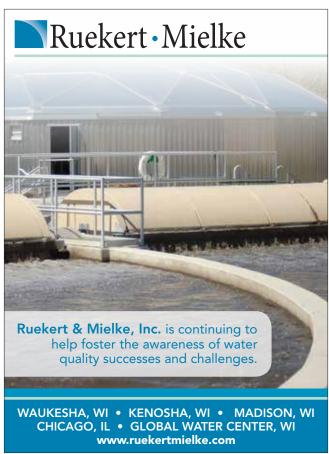
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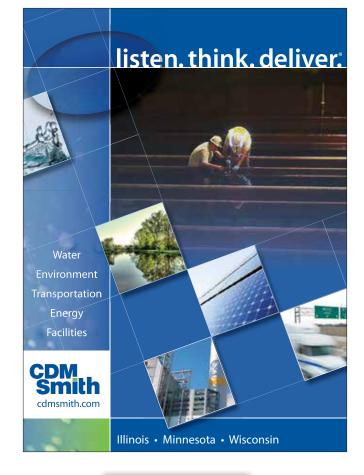
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YP Brewer Outing







Teach The Children Well

By Alan Grooms

short time ago my family and I had a good dinner table discussion of environmental issues in our world. My kids are 14 and 11, and overall I was impressed with how aware of current environmental issues they were and at the passionate arguments they made for action on their "favorite" (most troubling) issues. I believe our schools are doing a good job in giving them the basics, and the world they are growing up in allows them an unprecedented degree of access to information with the he advent

of the Internet (when I was a kid I was fortunate that my parents bought the family a set of encyclopedias – Google it if you don't know what encyclopedias are – which was a great information resource for that period but would be hopelessly stagnant as such today). I am proud that my kids grasp the importance of minimizing pollution and preserving nature. However, I did have to comment on the overall negativity of their view, and that I felt they were way too pessimistic about Earth's future (notwithstanding the discussion of the sun expanding and swallowing up the Earth billions of years in the future). I wanted to impress upon them that there are lots of smart and talented people pondering and working on solutions to the issues of not just today (such as alternatives to fossil fuels) but of the future (such as pharmaceuticals in our waters and how to sustainably manage resources).

As a kid, I remember reading about and watching the exploits of Jacques Cousteau. Cousteau was certainly part of the early environmental movement, already informing the public about pollution of the seas and climate change in the 70's. One other big concern around that time was how to feed the planet, that surely widespread famine was only a decade or two away. Then an agricultural revolution came, with improved fertilizers and crops and methods such that while humanity has not yet *literally* fed everyone, we have staved off the threat of global famine (at least for now). With that revolution came other problems, of course, and



now we wrestle with some of those, such as overuse of fertilizers and allocation of water resources.

I told my kids that I think the problems of today will be solved, that we will figure out how to adjust and adapt and improve, but the result of that effort is likely to result in yet more problems to solve. Fortunately, seeing how passionate and smart the school kids and young professionals entering the field are today, I am confident that somehow we as a society will figure it out and continue to move on as a species to the next problem, even if we are not today sure exactly how

that will happen. I am reminded of dialogue from near the end of last year's movie

"The Martian" (no, not the line where he says "I'll have to science the ____ out of this.", although I think that line seems pretty applicable to our field) where Astronaut Mark Watney tells his class essentially that you get to solve a problem, and if you solve that problem you then get another problem, and another one after that... I think it is an exciting time to be in the field of engineering (with the interesting challenges of trying to minimize energy consumption or even generate energy while recovering usable products and treating water to a very high degree) but then I laugh when I think that perhaps every generation of engineers thinks this too, as they take their turn trying to wrestle with and solve the problem of the day.

So what does this have to do with Central States and the Wisconsin Section? I'm proud to have the chance to interact and work with a great group of professionals who bring diverse backgrounds and experiences to the table. A group that is passionate and enthused about the problems of the day, and who want to make Earth as good as or better when they leave as it was when they arrived. It is an association where ideas and knowledge can be traded and together we can work for solving common, bigger picture issues and problems. So that, when we tackle the problems of today we can as a group share mutual congratulations as we collectively ask "What's next?" (S



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Real Progress

By Christopher Harrington

cannot recall details of the photo in my mind, but I believe it was of this same pool in the Mississippi that I was standing above on a recent muggy August night. The photo in my memory is from a talk by Kent Johnson of Metropolitan Council Environmental Services that was presented at the 2013 Minnesota Water Resources Conference. The presentation covered the history of just how far we have come in treating our waters of the twin cities with respect.

The photo I remember showed stinking sludge mats that once regularly floated in the Mississippi. I can only imagine what it would have been like to stand close to the river at that time on a hot summer night like tonight. Incredibly, it was not until 1966 that secondary treatment was added to the facilities in the Twin Cities. The installation of secondary treatment reduced pollution by a whopping 90%. Since then there have been many more improvements to our treatment and conveyance systems, taking us well beyond the initial improvements provided by secondary treatment. And now, not only are we treating the wastewater, but we are also improving the quality of our stormwater before it enters the river.

On this hot and muggy night, a woman and her two dogs were swimming in the river (I assume to cool off due to the ridiculous humidity). Now I know people that contend we are not going far enough to meet our responsibility to make all of our waters fishable and swimmable. I am not writing to dispute their claim that we need to do more. I am writing to say WOW!

Think about what we have already achieved. Just try to imagine stinking sludge mats in the Mississippi as it meanders between our state's two largest cities.

Of course, there are costs in parallel with this progress, increased energy consumption, and increased chemical production, to name two.



The good news is we are already putting a lot of collective brainpower into identifying the most efficient ways to reduce these costs. By "we" I mean you, me, and CSWEA. And progress on this cost reduction is real progress. When combined with the human health and environmental benefits that treating water provides we hit a triple bottom line bull's eye. Since 1927 (which was before completion of the first wastewater treatment plant on the Mississippi) CSWEA has been integral to the progress our industry has made. I am very thankful to be a

part of this organization. Thanks to all of you who came before, on whose shoulders our current members now stand.

I believe bringing us together is the greatest achievement an organization like ours can accomplish. Once we are together the sparks fly. Please make an effort to attend one of our CSWEA run events (or CSWEA recommended events) in person and bring your ideas, and your energy. We can all learn from you. Take note that the annual CSWEA & AWMA Conference on the Environment will be November 9 at the Minneapolis Convention Center, and the stormwater committee will be attending the Minnesota Water Resources Conference on October 18–19 in St. Paul.

Lastly I want to take a time out here to tip my hat to the hard working people that put on the Minnesota Wastewater Operators Association (MWOA) annual meeting (you know who you are). Thanks for putting together a great event. I attended that conference for the first time this year and really enjoyed it. It is great to have MWOA as a partner and I encourage CSWEA members to attend one of their events in the future. Our state is lucky that our very own collection systems committee runs workshops that benefit our members as well as MWOA members. Please contact the collection system committee co-chairs to learn more about their upcoming wastewater operations workshop tentatively scheduled for October 5 at the MCES Seneca Plant in Eagan.

Please do not hesitate to contact any of our officers and committee chairs if there is anything they can help you with.

www.cswea.org/MINNESOTA/officers CS

"Not only are we treating the wastewater, but we are also improving the quality of our stormwater before it enters the river."

Clean Water, The Next Generation

by Matt Streicher

t's hard to believe that it's already time to prepare another update for our CSWEA magazine and that a quarter of my term as the IL Section Chair has passed. Time passes all too quickly – especially during summer.

As I prepare this article, I am looking out over the mighty Illinois River at our family home in Peoria, and admiring all the clean water that we have worked so hard for (also while enjoying a cold "beverage" of course). Although many people may not look at the Illinois as "clean water,"

it is cleaner and safer today than it was for our [my] previous generation, a result of something that changed our industry dramatically – the Clean Water Act of 1972. As a family joke, we tell guests who visit that we are boating and swimming through the effluent of all the treatment plants our family has worked at; my father's from Elmhurst, my brother's from Thorn Creek Basin, and my own from Wheaton, and now Glen Ellyn/Lombard. The massive water way is something to marvel at and appreciate the clean water we have to enjoy.

The Clean Water Act of 1972 brought about major changes in the wastewater industry, making regulations stricter, and creating more innovation in the wastewater processes. That Act has done a tremendous amount of good for water in our nation, and is continuing to evolve. Some more major changes are coming about in Illinois with nutrient regulations, which are driving treatment plants today to evolve further, and start the innovation process again. I was fortunate to be invited to a recent trip to Denmark with other wastewater professionals to learn about wastewater processes used in their country, and how those processes could be applied here. Although the regulations are enforced differently in Denmark, they have the necessity to operate more efficiently and with stricter limits, which is the direction that many US WTTP's are heading. It was amazing to see their ability to use resources from influent not just to power their facilities, but also be able to put a significant amount of energy back into the grid, all while still meeting strict limits. They are able to truly define themselves as "resource recovery facilities" instead of "wastewater treatment plants."



As we are turning the page to stricter regulations and new ways of thinking (net-zero facilities), I now like to say that we also aren't treating wastewater anymore, but instead recovering our resources. This attitude is becoming a trend, and is clearly evident based on all the new incentives, innovations, and educational efforts towards these goals. Those of us that have been able to participate in the trips to Denmark are very gracious to the Danish for the efforts they have gone through to share their wastewater story with

us, and help bring those goals back to the US.

With this being the fall article, WEFTEC will have occurred by now. Hopefully you were able to visit New Orleans and participate in the conference, network, and bring home some valuable information. Hopefully you were also able to visit the Operations Challenge and support CSWEA. This will be my second year participating in the Operations Challenge, it is something I'm honored and humbled to be a part of, and work with the talented operators within CSWEA. When first being invited to be on the team I was very hesitant, I'm an engineer and although I like to think I'm handy, I was intimidated at the thought of working with people who operate our facilities daily. Their work is an essential part of clean water, and we could not do what we do without them. After participating in the competition last year, I have even more respect for operations, maintenance, and laboratory staff, and appreciate all that they have taught me. It's been a tremendous learning experience, and look forward to competing at WEFTEC again this year. If you haven't seen these competitions, I encourage you to come cheer on your CSWEA Pumpers and Shovelers!

While summer has nearly passed, fall and football season are just around the corner, yet another exciting time of the year. I hope that during our warm summer all of you were able to enjoy some form of recreation in our clean waters; whether swimming, boating, fishing, or simply enjoying a view – those fruits are the results of our tireless efforts to continue preserving our environment, while also protecting the health of the greater public.

"Whether swimming, boating, fishing, or simply enjoying a view – those fruits are the results of our tireless efforts to continue preserving our environment, while also protecting the health of the greater public."

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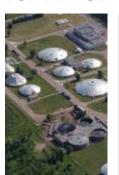
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Clark Dietz, Inc.	52	262-657-1550	www.clark-dietz.com
Crawford, Murphy & Tilly, Inc.	61	217-787-8050	www.cntengr.com
DN Tanks	51	847-782-0357	www.dntanks.com
Donohue & Associates, Inc.	OBC	920-208-0296	www.donohue-associates.com
Energenecs	19	800-343-6337	www.energenecs.com
Engineering America	30	651-777-4041	www.energenecs.com
Environmental Dynamics	22	573-474-9456	www.wastewater.com
Evoqua Water Technologies	8	373-474-7430	www.evoqua.com
Flygt a Xylem brand	4	IL 800-661-9944 WI 800-232-1417	www.flygtus.com
Force Flow	59	800-893-6723	www.forceflow.com
Foth	3	800-236-8690	www.foth.com
Gasvoda and Associates	36	708-891-4400	www.gasvoda.com
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HR Green, Inc.	41	800-728-7805	www.hrgreen.com
Hydro International	11	866-615-8130	www.hydro-int.com
JDV Equipment Corporation	53	973-366-6556	www.jdvequipment.com
Kemira	12	800-879-6353	www.kemira.com
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Kusters Water	38	800-264-7005	www.kusterswater.com
LAI, Ltd.	64	847-392-0990	www.LeyAssociates.com
Lakeside Equipment Corporation	IFC	630-837-5670	www.lakeside-equipment.com
LMK Technologies	57	815-433-1275	www.lmktechnologies.com
L.W. Allen, Inc.	35	608-222-8622	www.lwallen.com
McMahon Associates, Inc.	26	000 111 0011	www.mcmgrp.com
Medora Corporation (SolarBee and GridBee brands)	21	866 437 8076	www.medoraco.com
M.E. Simpson Co. Inc.	27	800-255-1521	www.mesimpson.com
Olympus Technologies, Inc.	39	541-689-5851	www.oti.cc
Pittsburg Tank & Tower	33	270-826-9000	www.watertank.com
Power Lube Industrial, LLC	47	800-635-8170	www.powerlubeind.com
Process Equipment Repair Services, Inc.	44	262-629-1059	
RHMG Engineers, Inc.	53	847-362-5959	www.rhmg.com
Ruekert & Mielke, Inc.	60	262-542-5733	www.ruekert-mielke.com
Sanitaire - a Xylem brand	IBC		www.sanitaire.com
Sensus	12	763-856-0110	www.sensus.com
Short Elliott Hendrickson (SEH)	65	651-490-2030	www.sehinc.com
Smith & Loveless Inc.	17	704-844-1100	www.smithandloveless.com
Spectrashield Liner Systems	64	800-284-2030	www.spectrashield.com
Strand Associates, Inc.	49	608-251-4843	www.strand.com
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TKDA	20	800-247-1714	www.tkda.com
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