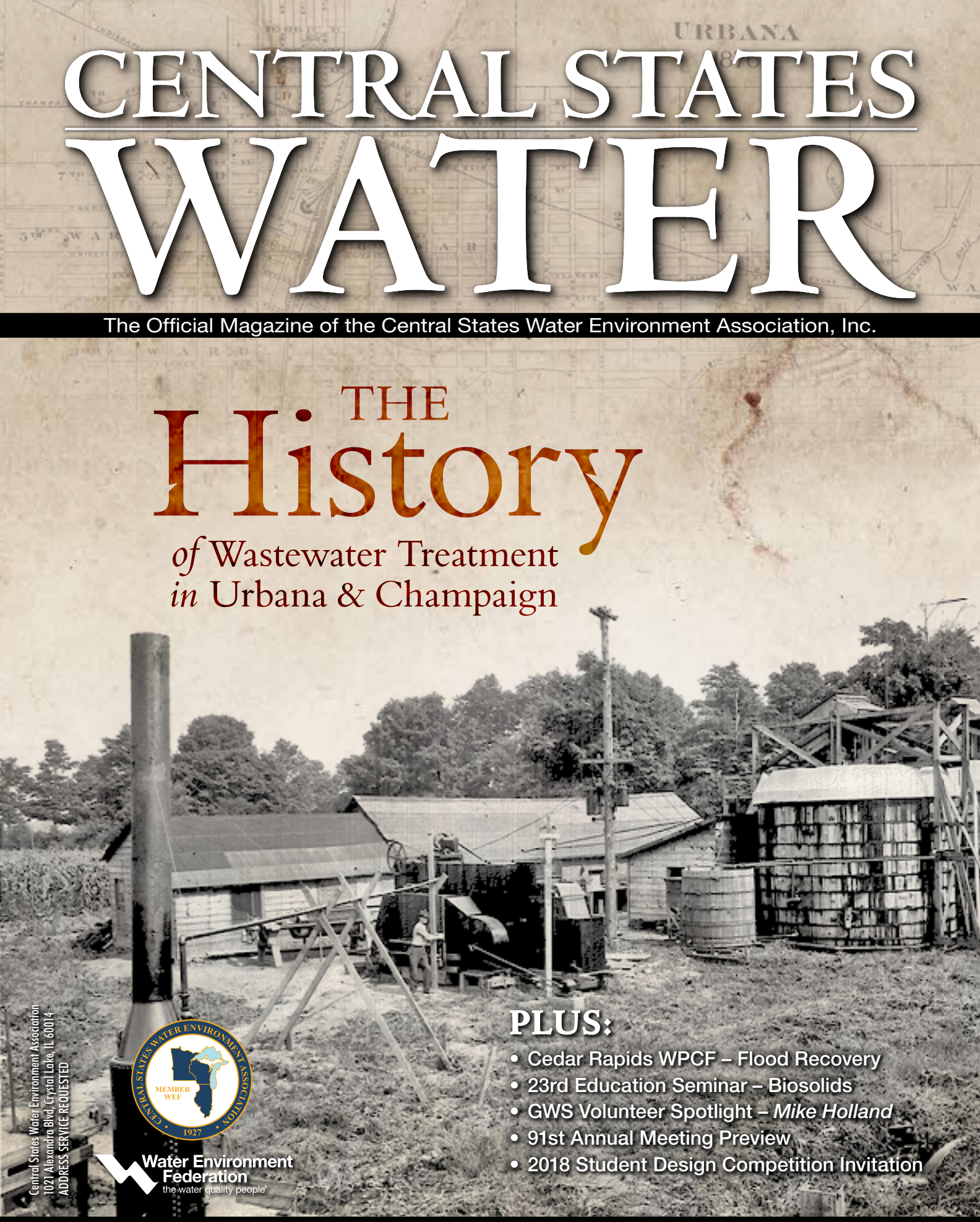
CENTRAL STATES WATER

The Official Magazine of the Central States Water Environment Association, Inc.

THE History *of* Wastewater Treatment *in* Urbana & Champaign



PLUS:

- Cedar Rapids WPCF – Flood Recovery
- 23rd Education Seminar – Biosolids
- GWS Volunteer Spotlight – *Mike Holland*
- 91st Annual Meeting Preview
- 2018 Student Design Competition Invitation

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CSWEA News

Section News

Published by:

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Advertising Co-ordinator: Stefanie Hagidiakow
Federal tax# 23-7378788

Central States Water, the official magazine of the Central States Water Environment Association, Inc., is published four times per year. Send comments, news items, gloss photographs or digital images to Mohammed Haque, *mhaque@cswea.org*

Send undeliverable addresses to: CSWEA, 1021 Alexandra Blvd, Crystal Lake, Illinois 60014

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An Exciting Year

By Sue Baert

I hope everyone had an enlightening WEFTEC experience and caught up with a lot of old friends. Congratulations to the Service Project Committee and YPs. WEF stated: "Because of your hard work and support, we were able to improve the local water environment in Chicago and educate the community about the importance of green infrastructure."

The CSWEA Pumpers took first in the lab and process control events of the Ops Challenge, Joan Hawley received her Professional Operator designation, Dr. Dan Zitomer and Tom Sigmund were named as WEF Fellows, and Matt Castillo and George Sprouse received awards for their research projects – just to name a few of our talented members. Thank you to all for making WEFTEC another success. I had every intention of attending and enjoying the meet and greet, technical sessions, leadership presentations, and the lively nightlife, but I was carted off to the ER for a three-day visit, so I missed the whole show. Not to worry though, I'm back in rare form!

Now that WEFTEC is complete, Central States will focus on putting together the 91st Annual Meeting which will be held in Oakbrook, IL at the Drury Lane on May 14-16, 2018. We are revising the conference schedule, and beginning with this year, possibly shortening the event by one day. It all depends on the pre-signed contracts with the Hilton and Drury. We will keep you informed. The Executive Committee has a planning meeting scheduled at the Hilton in Oakbrook on January 18-19, 2018. The Technical Paper Committee has called for abstracts and will be reviewing and selecting presentations over the next few months. Section leaders and members will be submitting or selecting members for well-deserved award nominations. Illinois's Local Arrangements Chair Jillian Kiss will enlist the help of local members to encourage members, vendors, and presenters to put on the best show ever. Some emerging tracks will be a stormwater tour with beverages, operator training, and the always-popular soft skills/leadership.

"Now that WEFTEC is complete, Central States will focus on putting together the 91st Annual Meeting which will be held in Oakbrook, IL at the Drury Lane and Hilton, on May 14-16, 2018."

Our Global Water Stewardship group is an exciting way to have hands-on experience working with water systems in economically strained countries. This group is also in need of funding to continue their great work.

My hat goes off to past presidents. I have been in this office for half a year, and trying to stay in tune with all this group does is massive. I always feel I should be going to more seminars and conferences, thoroughly rereading the bylaws and SOPs (these are available on our website if you truly look), and give more sound advice to those who ask. Yes, folks actually do ask for my input. It is humbling. With the annual conference fast approaching, I'm sure the second half of my term will be extremely busy and will fly by. CS

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WEF's New Focus

By Eric Lynne and Mark Eddington

Eric Lynne

Mark Eddington

WEFTEC is more than just the technical sessions, exhibit hall, and operations challenge; it is a time for MEETINGS! The House of Delegates (HOD) meeting is one of many behind the scenes tasks that help keep WEF a well-oiled machine. Year over year, we see a new WEF president, a few different trustees and delegates, but overall the same general mission: 1) to connect water professionals; 2) enrich their expertise; 3) increase the awareness and value of water; and 4) provide a platform for innovation. WEF adjusts the business plan to reflect current and future needs, this year having a focus on member value, development of a national operator certification system, and several other trackable initiatives.

There are five standing committees, because of their criticality to the sustainability of the HOD, as follows: Nominating, Steering, Budget, Outreach, and WEFMAX. Eric Lynne is now serving as the Chair of the Outreach Committee in its efforts to keep all the delegates informed with the activities of WEF, the other HOD committees, and workgroups.

Each year there are a handful of workgroups that are focus groups with specific tasks to improve the organization. The workgroups were identified as follows:

Member Relations: This is a rebranding of a previous workgroup, with a primary goal of implementing the new dues strategy.

- Provide input and disseminate information on WEF dues strategy
- Provide input on 2017 WEFTEC Membership Recruitment Initiative
- Continue dialogue on WEF and association only memberships

> "WEF adjusts the business plan to reflect current and future needs."

Operator Initiatives: This workgroup is re-emerging to enhance WEF's operator taskforce and operator advisory panel in their mission to help attract, prepare, and retain the next generation of operators.

- Develop promotional materials to support Operator Ingenuity Contest
- Survey associations on operator workforce development
- Review operator training materials to provide a gap analysis for content

Student Chapters Communications: This workgroup is new, and was developed based on feedback from the membership that student relations need to be enhanced.

- Review student chapter communications with associations and WEF to develop a gap analysis
- Identify challenges and successes that associations experience with students
- Update and maintain current contact information resources for student chapters and universities
- Provide improvement concepts to streamline communications with chapters

Note the workgroups are open to anyone (not just delegates). During the meeting, each delegate is asked to choose a workgroup to participate in for breakout sessions. It was clear that the Student Chapter Workgroup was a high priority to many associations, especially CSWEA, as all three attendees from our region (Eric Lynne, Mark Eddington, and Tracy Ekola) were present to participate in this relevant task force. Monthly meetings are scheduled – so ask your delegates for feedback as this develops.

After the HOD meeting, the delegates joined the Students and Young Professionals in the construction of their 10th Annual Community Service Project. Over 230 volunteers built a bioswale, rain garden, and permeable classroom at a local Chicago elementary school.

VOLUNTEER SERVICE RECOGNITION PROGRAM

The Committee Leadership Council and House of Delegates created the Volunteer Service Recognition program and awarded pins to several individuals for outstanding service.

OUTREACH UPDATE

A hot topic for outreach has been WEF's Utility of the Future program. This year an additional 25 water utilities were added to the Utility of the Future program, including CSWEA's own St. Cloud, MN. Consider submitting your facility to receive recognition for forward-thinking, innovative utilities that provide resilient, value-added service to their communities. Note, that recognition is only valid for three years; however, it can be reapplied for based on continued successes or advancements in other areas at any time.

"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."

WEF has hired a communication's director, which has sparked change in the organization. Travis Loop is active on the social media front, and indicated plans for re-branding the Water's Worth It campaign.

WEFMAX 2018

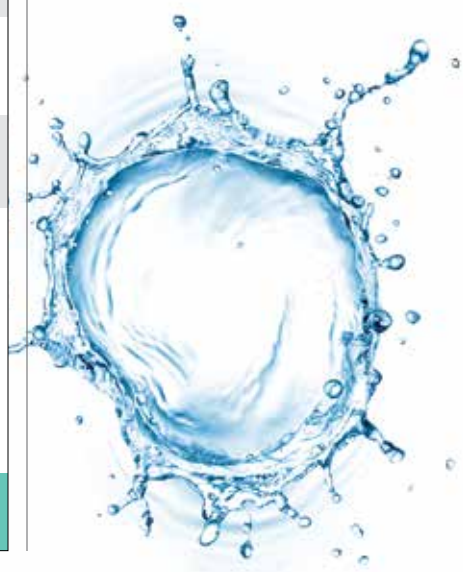
Finally, four (4) locations have been chosen to host WEFMAX in 2018. WEFMAX offers an opportunity for MA leaders at all levels to join together, share success stories and ideas on how MA members can be better served. These fast-paced, interactive meetings are open to all members and provide for both enlightenment and networking with other leaders of the water profession from throughout North America and beyond. The locations and dates are as follows:

- April 11-13, 2018: Little Rock, AR
- April 25-27, 2018: Indianapolis, IN
- May 9-11, 2018: Girdwood, AK
- May 23-25, 2018: Wrightsville Beach, NC

All association leaders are encouraged to attend at least one of these events if able.

DELEGATE TRANSITIONAL NOTE

Mark Eddington is currently serving as our second delegate through 2020. At the May 2018 Annual Conference Mark will be stepping down to serve as the 2nd Vice President; Derek Wold will continue the delegate term through 2020. Eric Lynne will remain the senior delegate during this transition and will engage Mark and Derek respectively for HOD activities. CS



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CSWEA's 91st Annual Meeting

May 14-16, 2018

Drury Lane, Oakbrook Terrace, Illinois

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New Stormwater Tour

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Water: Educate, Advocate and Learn!

91st Annual Meeting Highlights

The 91st Annual Meeting of the Central States Water Environment Association, Inc., will be held May 14-16, 2018 at the Drury Lane Conference Center in Oakbrook Terrace, IL. This year, we will be introducing an Operations Focus Session covering topics related to day-to-day wastewater operations as well as our continuing utility pricing, leadership and ethics sessions, operations track, and utility management track.

OPERATIONS & 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 & ENERGY PRODUCTION:

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

RESIDUALS, SOLIDS, & BIOSOLIDS:

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

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 & Combined Sewer Overflow Management

GENERAL:

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

WATERSHEDS & 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

SOFT SKILLS/LEADERSHIP:

- Leadership Skills
- Managing the Ill 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 Hand-books and Policies Violate Labor Law?
- Management Rights for Managers
- Social Media and the Workplace

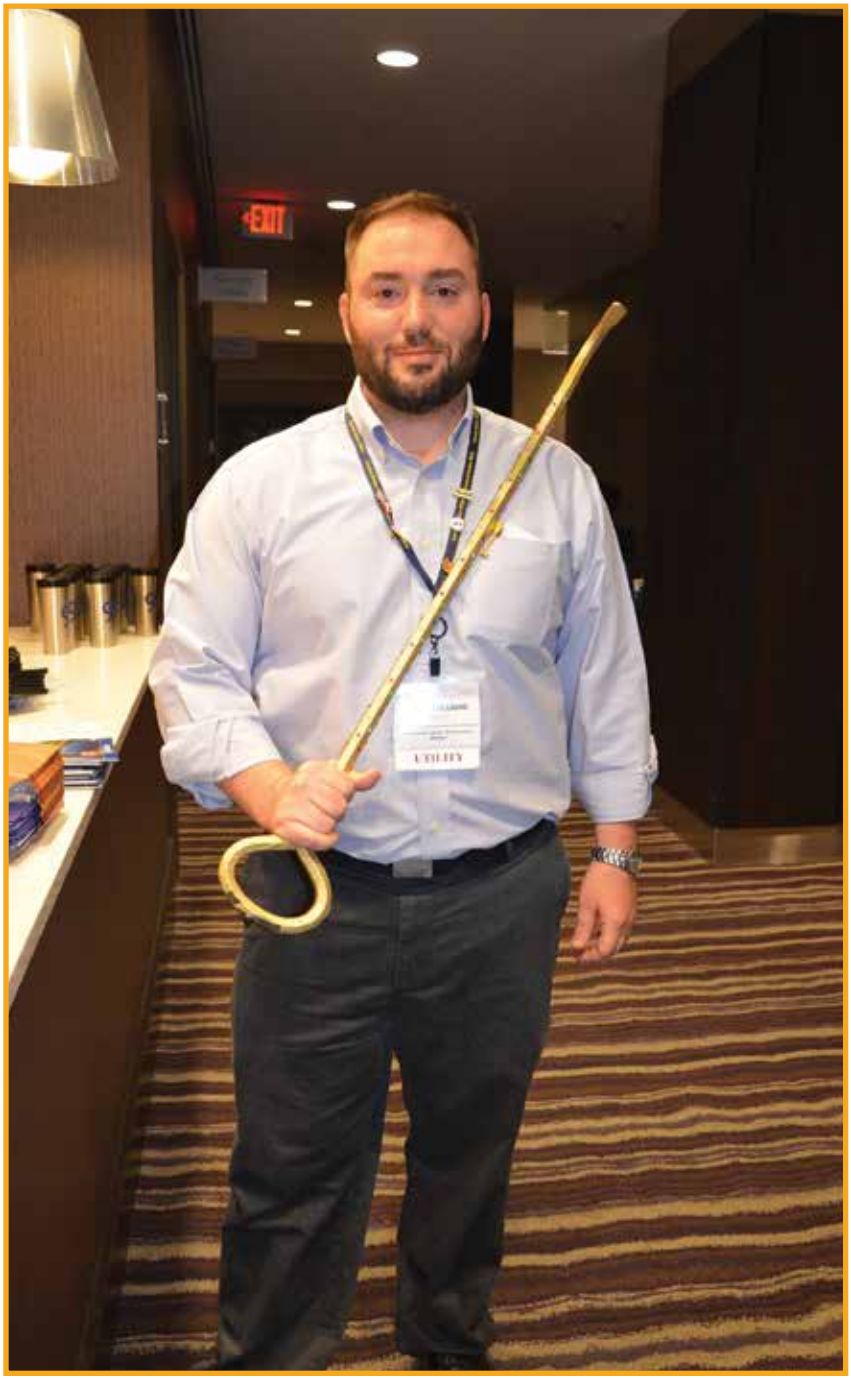
RESEARCH & DESIGN:

- 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, & Regulatory Issues

Global Water Stewardship (GWS) Volunteer Spotlight:

MIKE HOLLAND

By Elizabeth Bohne, GWS Marketing Chair



We got the chance to talk to Mike Holland, a committed member of GWS from the beginning. Mike and I are currently driving to the airport in San Jose on the way back from Uvita, where we spent the last week building a biogarden, meeting with water utility members and government officials, and educating school children and community members about wastewater treatment. Mike has experience on both the consulting and utility side. He also is very involved in CSWEA, holding multiple leadership roles. Check out what he had to say about GWS!

LIZ: What is your current position?
MIKE: I am the district engineer and assistant manager for the Kishwaukee Water Reclamation District in DeKalb, Illinois. My responsibilities include managing all the in-house engineering, working with the consultants to coordinate any outside work. My primary responsibility is to disagree with Mark Eddington (the District Manager) and argue with him as much as possible.

CSWEA

GLOBAL WATER
STEWARDSHIP

Click HERE to return to Table of Contents

LIZ: Do you want me to put that in here?
MIKE: Yeah!

LIZ: Alright… What do you argue about?
MIKE: Ummm… we don't really argue about much, I just tend to play devil's advocate to everything he says. We've worked together for a long time so we've developed a strong working relationship.

"It's been extremely beneficial to me professionally as well as personally to meet wastewater professionals from all over the place and get to learn about where they came from as well as the different industry challenges they have faced and overcome."

LIZ: What is your role in Central States?
MIKE: I am the Illinois section treasurer, Golden Manhole chair, Student Design Competition chair, and I am the WEFTEC reception chair.

LIZ: Wow! That must keep you busy. How has being so involved in CS helped with your career?
MIKE: Well the people in central states are phenomenal. The people all come from different states, different backgrounds, and different experiences. There has been so much to learn and gain from them. It's been extremely beneficial to me professionally as well as personally to meet wastewater professionals from all over the place and get to learn about where they came from as well as the different industry challenges they have faced and overcome.

LIZ: And how did you get involved in GWS?
MIKE: I got involved with GWS at CSX in 2013 when we were trying to find ways to improve the student design competition. I mentioned that the students really like Engineers Without Borders type projects. Mohammed said, "Well, we can do our own EWB type projects. Let's start in Costa Rica."

LIZ: So you were in it from the beginning?
MIKE: Yeah! I didn't get to go on some of the first trips because I had newborn babies. I was peripherally involved, I was part of a lot of the phone conversations about it. I guess when GWS was officially incorporated and we had chair positions was when I really got more deeply involved. I was nominated for fundraising chair so I took that position for a year where I worked with the treasurer, Matt Striecher, to figure out how much money would be needed and organized various fundraising opportunities to meet those goals.

LIZ: And now what is your involvement?
MIKE: Now I'm a volunteer. I was in charge of coordinating the biogarden construction for this past trip. I also work with the Student Design chair to make sure the competition runs smoothly, and then I am the main point of contact for the competition winners in the months leading up to the trip. I've also participated in the past two trips.

LIZ: What's the best part of being involved with GWS?
MIKE: It's probably Mohammed snuggles. He's a very cuddling guy. I got a BAD sunburn on this trip and I was disappointed because I didn't get to take advantage of my time with him.

LIZ: Yeah, aloe is definitely your friend right now. Anything else?
MIKE: Well that. And also that I feel like my professional experience can really be put to use to help improve public health and protect the environment in what I believe to be one of the most beautiful places on earth.

LIZ: I agree, Costa Rica is incredible. What was the best part about this trip?
MIKE: Definitely the people. I got to develop some great friendships with the students and also spend time with the other GWS members. Since we all are in different places, we typically work through conference calls. The trip is a great opportunity for us to be together and bounce ideas off each other on how we can improve the organization. This was also the first year that we built a biogarden. It was installed at a preschool as a means to treat grey water as well as for an educational opportunity. When we arrived we discovered that there was no way we would be able to use any equipment so we had a lot of manual labor ahead of us. It was a lot of HARD work, digging out a hole for it and moving all of the stones in by hand, but it was very rewarding. We learned a lot too for future years. We also collected a lot of information for the 2018 student design competition. We're starting to have a decent amount of recognition in the communities we work with and they're excited for the systems to go to construction.

LIZ: So why do you think people should get involved in GWS?
MIKE: Well, it's a great way to give something back to people who need it. It also helps you learn more about the wastewater profession, learn more about different cultures, learn about the state of water globally, and really see the importance of the work we do as wastewater professionals. And, it's a great way to meet and build relationships with like-minded people in the industry. You also get to hang out with me. So that's reason alone.

LIZ: Claro que si.

To learn more about GWS and how you can get involved, or to donate, visit *www.globalwaterstewardship.org* CS

The Central States Water Environment Association 2018 Student Design Competition

GREETINGS,

I would like to introduce you to the Student Design Competition sponsored by the Central States Water Environment Association (CSWEA). This year, the CSWEA competition will be held on the afternoon of **Monday, April 9, 2018**, the day before the CSWEA Education Seminar at Monona Terrace Convention Center in Madison, WI. This is a great opportunity to participate in the competitions and attend the Education Seminar the following day.

The Student Design Competition is described in detail on the attached announcement. **There are three different categories in the Design Competition: Wastewater Design, Environmental Design and the Global Water Stewardship Project.** This is a unique opportunity for students at the college level to demonstrate their engineering skills and practices by researching and preparing a design for a water quality based project and presenting their project to water industry professionals. The competition at the CSWEA level is intended to feed into the national competition at the annual WEFTEC conference, which this year is scheduled for September 29–October 3, 2018 in New Orleans, Louisiana.

The Student Design Competition is designed to be a function of the WEF Student Chapters program however a WEF Student Chapter is not required to compete. CSWEA does not require WEF student membership to participate in the competition but the winning team will have to ultimately be WEF student members to participate in the WEF competition in New Orleans. However, CSWEA will provide student membership enrollment in WEF for teams/individuals who represent CSWEA at WEFTEC.

The State Sections (Wisconsin, Illinois and Minnesota) of CSWEA have budgeted funds to assist individuals or teams from their State to present at the CSWEA competition event in April. We understand it is hard to schedule students to participate and will be as flexible as possible in working with students and professors to afford the opportunity to participate on the design competition date. Design projects from first semester are eligible along with design projects that are being developed as part of a second semester class. Please read over the attached announcement and provide this information to any interested students in the water quality field that you feel may benefit from such an experience.

I look forward to hearing from you with any questions or if you need additional information on how to participate in these events. I can be contacted by phone at 815-762-5919 or email at *mholland@kishwrd.com*.

Best regards,

Mike Holland, CSWEA Student Design Competition Chair CS

GLOBAL WATER STEWARDSHIP

GLOBAL WATER STEWARDSHIP:

PALMAR SUR, COSTA RICA

2017-18 Problem Statement

PROJECT UNDERSTANDING

- **Location:** Palmar Sur, Costa Rica
- **Population:** 1985 currently with expected growth of about 50 people per year San Marcos 511, El Hangar 462, Zona Americana 212, Palmar Sur roughly 800. Nearby 11 de Abril has roughly 500 people.
- **Number of water services (commercial and residential):** 329
- **Water usage:** Design = 200 L/person/day; **Actual:** To be calculated from consumption document in reference file
- **Average Precipitation:** 3,900 mm/yr
- **Average Temperature:** 79 degrees Fahrenheit

TYPICAL INFLUENT

Parameter	Concentration
(mg/l) BOD5	280
TSS	220

REQUIRED EFFLUENT

Parameter	Max. Level
(mg/l) BOD5	50
TSS	50

There are very few centralized treatment systems in Costa Rica. In the rural areas, septic systems are very common, with greywater often being discharged directly overland. The leach fields are very small and very shallow. Although law states the leach fields must stay within each individual property, they often do not. Also, the groundwater table is often high, 2.5 to 5 meters deep which does not allow for the proper detention of the effluent.

Click HERE to return to Table of Contents

The area of concern is a specific collection of communities known as Palmar Sur, Costa Rica. Palmar Sur is a community in the central-south part of Costa Rica about 100 km south of Quepos, located near the Pacific Ocean in the province of Puntarenas. The community is surrounded by plantations, estuaries, mangroves and marshes. There is another community known as Once de Abril that is nearby, to the east of Palmar Sur, which should be considered in the design for probable future expansion. However, the primary focus should be on Palmar Sur.

Palmar Sur itself is physically divided by an airport runway, and its population can be divided into several different sections. Each section is primarily residential, but the socioeconomic statuses, and current utilization of septic tanks vary. The need for a sanitary wastewater solution is still needed for each section. Additionally, the entire population is relatively stable with no current plans for major development. Any new development that may go in the area within the design life of the treatment facility would be required to build their own sewer and treatment systems. Documents outlining the different sections of Palmar Sur, can be found by following the link in the reference section of this document.

The community has both individual septic tanks and collective community septic tanks. Most of Palmar Sur has collective septic tanks, but there are some areas that have individual septic tanks that directly discharge to waterways (see map in reference documents). In total, there are 94 septic tanks for 391 users (homes). 11 de Abril has 143 users (homes) on individual septic tanks. There is some sanitary sewer infrastructure already in place in Palmar Sur *(see reference documents)*. There is no existing sanitary sewer infrastructure in 11 de Abril.

The local utility has been proactive in seeking a centralized treatment solution, and has an idea of what they would like for a solution in terms of a collection system, and the actual treatment system. Using existing infrastructure is recommended as a cost saving measure, if feasible. In terms of the treatment process, Palmar Sur would like a low maintenance, aesthetic and natural looking process. Constructed wetlands should be strongly considered. Lagoons, and other low operation treatment options should also be examined and evaluated.

The septic tanks in the community are either poured in place concrete or plastic structures with no standard sizing, location or plumbing being used. The use of plastic for septic tanks is much cheaper than concrete. However, the plastic ones break more frequently due to the change in pressure from pumping the septic tanks. The homeowners are responsible for pumping their septic tanks, and are legally obligated to do so, but there is no control to ensure that they do.

In Costa Rica, especially in the rural areas, toilet paper is not disposed of in the toilet. This is due to low water pressure, smaller pipe sizes, and general goal to reduce solids going into septic tanks or treatment system. Toilet paper is disposed of along with the other solid waste. A lot of refuse in rural areas is burned.

It is Costa Rican law that the property owner is responsible for their individual connection to the sewer main, however, it is necessary to plan for funding the entire connection. It is also Costa Rican law that once a sewer main is constructed in front of a property, the property owner has to pay for the service whether they connect to it or not.

TREATMENT SITE LOCATION

Palmar Sur, unlike most Costa Rican communities, already has two publicly owned land options set aside, with another private land site potentially available. For land options, see below:

SITE # 1 – ZONA AMERICANA

Owner Palmar Sur ASADA (public utility)
Size To be scaled from Snitcr.go.cr
Price $0

Considerations

- Near Zona Americana's disposal site
- Appears to be out of any protected zones (subject to verification).

SITE # 2 – SAN MARCOS

Owner Palmar Sur ASADA (public utility)
Size To be scaled from Snitcr.go.cr
Price $0

Considerations

- Large tract of land allows for various treatment options
- Land appears to be dry and relatively high, next to a canal that flows into Pacific Ocean.
- Needs pumping from Zona and Palmar Sur South
- ASADA requires this land to look natural, and be a nature/water/wetland park.
- ASADA preference

SITE # 3 – EL HANGAR

Owner Private
Size To be scaled from Snitcr.go.cr
Price Unknown

Considerations

- Unknown Price
- Privately owned
- Appears to be out of any protected zones (subject to verification)
- Ease of acquisition uncertain

History of Palmar Sur

By Elizabeth Bohne, GWS Marketing Chair

The location of the 2018 Student Design Competition is a small town with a unique history and culture. Palmar Sur is located on the Sierpe River, making it a great place for connections to a large variety of destinations. It is a port, allowing easy access to surrounding areas. The Terraba-Sierpe National Wetlands are easily accessible from the town which is where you can find some of the large mangrove trees in the country that are home to a diverse wildlife including colorful birds like herons, reptiles like caimans, and monkeys!

There is also a mysterious collection of perfectly spherical stones that are situated throughout the town that date back to the pre-Columbian era. They are believed to have been created around year 1000 before the Spanish conquest. The earliest known spheres date back to year 600! These stones are hand carved and can be the size of a bowling ball, or large enough to weigh several tons. They are made of black granite which is a material that is not naturally found in the Osa Peninsula. It is believed that the culture of people who created the stones disappeared after the Spanish conquest. They were discovered in the 1930s when the United Fruit Company was clearing the jungle for banana plantations. A rumor started among workmen that the stones were hiding gold, so some of them were drilled into or blown up by dynamite. There was no gold found, and soon after the authorities intervened. A scientific investigation began which led to archeological digs in the area surrounding Palmar Sur. The findings were published in 1963 in Archaeology of the Diquis Delta, Costa Rica. There was very little information about these stones found so their purpose is a mystery. There are many myths surrounding the stones, such as that they were made by nature and that native inhabitants had a potion that could soften the rock. In the cosmogony of the Bribri they are considered "Tara's cannon balls" and were used by Tara, the god of thunder, to shoot at the god of wind and hurricanes, to drive the storms away. There is also rumor that they were transported with the aid of extraterrestrial aliens. Even though the exact purpose is unknown, they are interesting to see and are a part of the culture in this small village.

The recent storms have also had an impact in Palmar Sur. The town has flooded and there has been significant damage to local infrastructure, including washing away of several homes. There is a lot of agricultural land in the area (the banana plantations noted above, as well as plantains and palms!) which are owned by local co-ops. This land has flooded and put significant financial stress on the region. CS

"There is also a mysterious collection of perfectly spherical stones that are situated throughout the town that date back to the pre-Columbian era."

Palmar Sur prefers to use Site #2, as aforementioned studies have recommended this site due to the relatively large size, ease of acquisition, and location. Using Site #2 would allow 11 de Abril to gravity flow into the treatment site. However, pump stations would likely be needed for the two Palmar Sur sections of town.

Even though Palmar Sur prefers Site #2, Sites #1 and #3 should be evaluated as well. Verify that using Sites #1 and/or #3 would not be as advantageous as Site #2.

ADDITIONAL PROJECT CONSIDERATIONS

The specific areas of concern with the collection and wastewater treatment system are described as follows:

1. The location of the treatment facility needs to be adequately sized for anticipated flow, future growth, with rainfall taken into account.
2. Treatment facility should be designed to be able to treat to a level of 50 mg/L BOD and 50 mg/L TSS.
3. Due to the socioeconomic status of the community, user fees must be lower than 5,000 colones, per month.
4. The location of the treatment facility needs to be easily attainable and needs to be located in an area which is not at risk of flooding. Additionally, be aware of and protect existing drinking water sources. Treatment site location also needs to be evaluated for ease of construction and potential impacts of nearby homes and businesses. The average and maximum flows for the proposed collection system need to be determined.
5. Take special care to not disturb the airport runway.
6. Polyethylene pipe has been recommended for construction, because of ground shifting, however, this should be verified during design.
7. The septic tank leach fields are very small and shallow. The native soils are not conducive to treatment through a leach field.

PROJECT APPROACH

For this project, CSWEA is soliciting designs for a long-term solution to the sanitation problem in this development. In general, the solution approach should be to construct a centralized treatment system with a complete collection system.

DESIGN OBJECTIVES & CONSTRAINTS

The following are items that should be discussed or implemented as part of the design project. The design that best accomplishes these goals will have the highest level of long-term success.

1. The project must take into consideration the local weather and heavy rainfall.
2. The equipment must have a high level of reliability. The resources are not available for many equipment breakdowns.
3. The equipment must have a level of redundancy to maintain treatment if some equipment is in temporary disrepair.
4. The solution must have a low operation and maintenance cost due to the residents' limited income. Special consideration will be given to designs that are energy efficient and/or partially self-sustaining from an energy standpoint.
5. The project capital cost must be low due to limited funding.
6. The project must be easy to operate and maintain. There is no wastewater training available in the area or wastewater operators' associations. Local staff will have to be trained on the system operation and maintenance, but may only be able to operate the system part time, so the system should be fairly self-operational.
7. The wastewater treatment equipment must be easily replaceable with parts readily accessible.
8. Treatment equipment would presumably be compatible with the existing electrical system.
9. Consider simplicity (less O&M the better) in design whenever possible.
10. It is recommended that the teams design for the year 2038 (20 years). Provide justification with any variances.
11. Design for Palmar Sur, but it is recommended that provisions for 11 de Abril are included.

DESIGN BASIS

Each submittal shall include a summary of the following items, as needed, for the project:

1. What should be the pipe size, depths and slopes?
2. With houses being located lower than the roadway, where is the most feasible location for a potential collection system (under roadway, rear yards, etc.)?
3. How should the collection system convey flow to the centralized treatment facility?
4. What pipe bedding and cover should be used?
5. What manhole spacing should be used?
6. What design should be used for the centralized treatment facility? What would be the required footprint and depth of this facility? Will it fit into the plots of land available?
7. What degree of expandability should be built into the design? Would this be acceptable by the village? How much would this help with the ongoing operation and maintenance costs? What will be the design year? What will be the design average daily flow and peak hour flow?
8. What type of odor control should there be, if any?
9. Should the equipment be provided through a US equipment supplier or a Costa Rican equipment supplier?

10. Should back-up power provisions be made in the design since power outages happen frequently? If not, should a holding tank be included at the treatment system to store water during times of power outage?
11. What Supervisory Control and Data Acquisition (SCADA) systems, if any, should be at the treatment system? Should the SCADA system be operational-based or monitoring-based?
12. What is the maximum level of water in the discharging waters? What will the hydraulic grade line be for the rest of the treatment system and collection system?
13. What is the maximum level of water in the nearby waterways? Will that affect your site selection?
14. With electrical rates as high as $0.25/kWh, alternative electrical or systems utilizing low energy consumption are encouraged.
15. Develop a realistic project timeline with critical milestones.
16. Consider maintenance requirements that may involve temporarily taking certain systems out of operation in the design and how to account for demand during maintenance.

17. Develop Engineer's Opinion of the Cost of Construction.
18. Develop an operations and maintenance forecast for 10- and 20-year timelines.

REFERENCE INFORMATION

Information obtained by CSWEA on the Palmar Sur project has been saved here for your use: *https://drive.google.com/drive/folders/0Bw06nT_xNofbjV5SFB-WRm5JM0k*

Teams are encouraged to use credible sources for additional information needed to complete their designs. Coordination with an academic advisor and/or water treatment professional(s) is highly encouraged.

Refer to the WEF and CSWEA websites or contacts for the latest design competition guidelines: *http://wef.org/PublicInformation/page.aspx?id=136* and *http://cswea.org/SYP/Competition*. If the posted guidelines are outdated, teams are advised to use the previous year's guidelines. Deadlines will be similar to years previous, but interested teams should contact their CSWEA student representative for more information. CS

Click HERE to return to Table of Contents

23RD ANNUAL CSWEA EDUCATION SEMINAR

APRIL 8, 2018

MONONA TERRACE, MADISON

BIOSOLIDS: Generating Value through Innovation

CSWEA continues to host its Annual Education Seminar on April 8 in Madison, WI at the Monona Terrace. This year's theme will be Biosolids: Generating Value through Innovation.

We have assembled an impressive list of speakers who will discuss current research, case studies, regulatory challenges, along with numerous innovations as they relate to biosolids. The program will allow attendees to appreciate both practical and theoretical approaches being conducted both locally and nationally.

LODGING ACCOMMODATIONS

A limited number of rooms are available at The Hilton Madison Monona Terrace, 9 East Wilson St, Madison. The rooms have been reserved at a conference rate of $139 per night and will be held until March 10, 2018. For reservations, please call the hotel at 608-255-5100 and indicate your affiliation with CSWEA Education Seminar. Parking is available for a fee at the Hilton or next door at the Monona Terrace Community and Convention Center. Other lodging is available nearby at the Best Western Premier Park Hotel (608-285-8000) at $144 to $194 per night and will be held until March 9, 2018. This hotel is about 0.7 miles walking distance from the Monona Terrace Community and Convention Center. Of course, other accommodations are available in the Madison area.

8:10-8:50 Product Quality as Criteria for Process Selection for Solids Management at Blue Plains

Mathew Higgins, Bucknell University

In 2000, DC Water embarked on a research program to understand how different processes affect product quality in terms of dewatering, cake odors, and reactivation/regrowth of pathogens and indicator organisms in biosolids cake with the goal of selecting a process that produces a product that dewaters well, is low in odors, and met Class A indicator and pathogen requirements. The research program evaluated numerous anaerobic digestion technologies, settling on thermal hydrolysis/anaerobic digestion as the process that met these criteria. This talk will review the issues of odors, reactivation and regrowth, and how they are affected by different processes, which provided the data to support DC Water's selection of thermal hydrolysis.

MATT HIGGINS is the Claire W. Carlson Chair in Environmental Engineering at Bucknell University where he has taught civil and environmental engineering courses since 1995. Over the last 20 years, his research has focused on anaerobic digestion, dewatering, pathogen destruction, cake quality, and thermal hydrolysis. His work with his collaborators has won several awards including the Environmental Engineering Excellence Award from the American Academy of Environmental Engineers, the Excellence in Innovation Award from the Water Environment Research Foundation and the Professional Research Award from the Pennsylvania Water Environment Federation.

8:50-9:30 Digester Gas End-Use Opportunities for Today's Resource Recovery Facilities

Dr. Randy Wirtz, Strand Associates Inc.

While there are many successfully stories of municipal resource recovery centers running codigestion/cogeneration facilities, the economics of these facilities don't always show a positive return. The generation of pipeline quality gas from digester gas is not a new technology, but the application at municipal resource recovery facilities is. In 2014, Renewal Fuel Standards (RFS) were modified to define digester gas as a "D3" renewable identification number (RIN) fuel. The value of D3 RINs is approximately three times that of other digester gas produced, however, the cost to produce the pipeline quality gas is high, the market is not guaranteed, and there are complications with municipal facilities that codigest other feedstocks. This presentation will provide background for the RFS RIN market, compare digester gas use options, and present a few case studies related to digester-to-pipeline quality gas projects.

DR. RANDY WIRTZ is a senior project manager and lead process design engineer at Strand Associates, Inc. Randy has been with Strand for 24 years and he specializes in biosolids and energy management, as well as nutrient removal processes. He has been the project manager and lead process engineer on numerous wastewater energy projects, including codigestion and cogeneration projects, as well as recent digester-to-pipeline gas projects. Randy earned his BS degree in Civil/Environmental Engineering from the University of Wisconsin-Platteville, and his MS and doctoral degrees in Civil/Environmental Engineering from Iowa State University studying anaerobic digestion process fundamentals.

9:50-10:30 Kenosha Case Study: Thermal Hydrolysis Project

Curt Czarnecki & Melissa Arnot, Kenosha Water Utility

As part of a solids process upgrade, Kenosha WI installed the PONDUS thermo-chemical hydrolysis unit to treat their waste activated sludge (WAS). The process uses heat and a chemical to treat the sludge and ultimately create more biogas. The presentation will discuss the overall project and focus on the results and benefits from the process. Operational information will also be provided including required maintenance and challenges.

CURTIS CZARNECKI is the Director of Engineering Services for the Kenosha Water Utility. He graduated from the University of Wisconsin-Platteville with a Bachelor's Degree in Civil Engineering. He has worked for a consulting engineering firm with an emphasis in the fields of water, wastewater and stormwater management. In addition to his current position with the Kenosha Water Utility, he has also served as the Water Engineer, Director of Water Distribution and Sewer Collection, and Director of Infrastructure Services.

MELISSA ARNOT, Director of Operations, Kenosha Water Utility, received a Bachelor's Degree in Civil Engineering from UW-Platteville. Melissa is a certified wastewater and water operator and has worked in the water and wastewater industry for the past nine years.

11:10-12:00 Regulatory Roundtable – Biosolids Residual Programs and their Future

John Murray, Metropolitan Water Reclamation District of Greater Chicago
Mathew Magruder, Milwaukee Metropolitan Sewerage District
Larry Rogacki, Metropolitan Council Environmental Services

Speakers from three major metropolitan districts will give a brief overview of their respective biosolids program and current challenges each unique facility faces. They will also discuss how they see the future of their programs including challenges, opportunities, and regulatory climate. Presentations will be followed by a round table discussion of the current state of biosolids in the region and further discussion about each facility, advancements in technology and forecasts about the future of biosolids in the upper Midwest.

JOHN MURRAY has worked in the water industry for over 18 years. John is in his 16th year of service at the Metropolitan Water Reclamation District of Greater Chicago and his current position is the Director of Maintenance and Operations. Prior assignments include serving as Section Head for the District's Stormwater Management Section and Local Sewer Systems Section, and working in the District's Solids Management Program. John is a licensed professional engineer in Illinois and holds a Bachelor of Science in Civil Engineering from Purdue University.

MATTHEW MAGRUDER has been with the Milwaukee Metropolitan Sewerage District (MMSD) for over eight years, and he is currently serving as the Environmental Research Manager. In addition to managing and coordinating the District's research efforts, Matthew represents the District on various planning advisory groups, he is the co-chair of the Water Environment & Reuse Foundation's LIFT Working Group for Green Infrastructure, and he is currently serving as the Chair of the National Science Foundation Industry/University Cooperative Research Center for Water Equipment and Policy. Matthew received his B.S. in Biology from UW-Whitewater, his M.B.A. from Cardinal Stritch University, and is an American Society for Quality Certified Six Sigma Black Belt.

LARRY ROGACKI is the Assistant General Manager at the Metropolitan Council Environmental Services (MCES) located in St. Paul, MN. Larry has been with MCES since 2001 and is currently responsible for the Support Services Business Unit which includes overseeing and directing over 130 technical staff supporting MCES operations. Departments included in Larry oversight include Process Engineering and R&D, Process Computer (SCADA systems), Laboratory Services, Industrial Waste/Pollution Prevention, Performance Excellence and Analytics, and Continuous Improvement.

1:00-1:40 Understanding the Mechanisms of Dewatering to Explain the Negative Impacts of Biological Phosphorus Removal on Dewatering after Anaerobic Digestion

Mathew Higgins, Bucknell University

The Water Environment & Reuse Foundation recently funded a research project to better understand the mechanism of dewatering, especially the factors which impact the final cake solids after dewatering. The research evaluates the specific role of water in dewatering process, with the hypothesis that it is only the free water in suspension that can be removed by mechanical dewatering. If this hypothesis is true, it leads to the outcome that the water contained in the floc is the main determinant of final cake solids. The research seeks to mechanistically explore what factors affect the floc water content, and how different processes will impact this floc water such as biological phosphorus removal, thermal hydrolysis, and different dewatering processes. This presentation will summarize this research and also the latest findings from the project.

1:40-2:20 Using Metagenomics to Optimize Performance of Resource Recovery Systems

John Tillotson, Microbe Detectives

Mr. Tillotson will summarize key findings and future plans for two metagenomic studies led by Microbe Detectives: Biogas Anaerobic Digestion and Biological Nutrient Removal. The objective of these studies is to create unique insights into operational performance opportunities of these renewable resource recovery systems. Methods include application of modern DNA science and technology, collection of operational data, data science analytics and support from a strong group of industry experts employed across a range of municipalities and engineering consultancies.

JOHN TILLOTSON serves as CEO of Microbe Detectives and is now in his third year as Coach for the Water Council's BREW water-tech start-up accelerator. He was formerly the Chief Marketing Officer of Phigenics, an innovator in preventing waterborne diseases from building water systems. As the VP of Sales and Marketing for nPhase, an Internet-of-Things cloud platform, he provided business leadership from start-up through two acquisitions, Qualcomm followed by Verizon. As a product and marketing manager at Nalco he commercialized multi-million dollar water technology innovations, earning Marketer of The Year twice, Chairman's Achievement Award, and Grand Prize Suez Innovation Awards. Mr. Tillotson also has a background as a toxics use reduction consultant, working with the Massachusetts Toxics Use Reduction Institute and the United Nations Institute of Training and Research. He holds an MS in Civil Engineering from Tufts University, and a BS in Chemistry and Geology.

2:40-3:15 Can the Biosolids Regulations Evolve to Accommodate Products Created at WRRCs?

Chris Hornback, NACWA

The practice of recycling biosolids for use as fertilizer to maintain productive soils and stimulate plant growth has long been accepted in the Central States area and across the United States. This practice is regulated by the U.S. Environmental Protection Agency's (EPA's) Part 503 biosolids regulations. As WRRCs move to new and innovative models for resource recovery, complications can arise. WRRCs are exploring the recovery of products from the treatment process that are virtually free of any contaminants or so heavily

processed that the product bears little or no resemblance to the sewage sludge. But does this mean that the product should not be regulated by the existing 503 regulations? NACWA has been in discussion with EPA with the goal of developing a means of handling and regulating such products outside of the 503 regulations.

CHRIS HORNBACK joined the National Association of Clean Water Agencies in April 2001 and is currently Chief Technical Officer, responsible for all of the Association's regulatory and technical initiatives and for formulating NACWA's regulatory policy. He oversees the Association's efforts related to water quality, biosolids, and utility manage-ment and manages NACWA's regu-latory affairs team. Mr. Hornback coordinates the activities of six standing committees and workgroups and manages the association's Targeted Action Fund. Prior to joining NACWA, he worked as a Senior Associate with Booz/Allen/Hamilton, a multinational management consulting firm. During his five years with Booz/Allen, Mr. Hornback specialized in the areas of hazardous waste management, solid waste management, underground storage tanks, risk management planning, and clean water issues. He has a B.A. in Environmental Science from the University of Virginia.

3:15-3:55 How about "Advancing Biosolids Research through Collaboration and Innovation"?

Christine Radke

Almost one-third of the Water Environment and Reuse Foundation's (WE&RF) research projects have focused on the treatment and management of residuals and biosolids with cross connections with nutrient recovery, energy production and efficiency, and trace organics in biosolids. This presentation will highlight WE&RF's current research activities regarding high quality biosolids and new technologies and techniques to achieve Class A biosolids.

CHRISTINE RADKE is a Research Program Director for WE&RF's where she manages the resource recovery and nutrients research areas. Christine was a Research Project Manager at WE&RF (2005-2007) working on operations optimization and energy, and returned to WE&RF after an eight year stint at the Water Environment Federation. Prior to devoting her career to the not-for-profit sector, Christine worked at Black & Veatch as a junior engineer, specifically working on SOPs and construction projects for water systems, and worked at the South Carolina Department of Health and Environmental Control managing industrial and agricultural NPDES and construction permits. Christine has a Bachelor of Science degree in Environmental Engineering from Manhattan College and is a certified Project Management Professional (PMP). CS




WEFTEC 2017 CSWEA/IWEA WELCOME RECEPTION

The 2017 WEFTEC CSWEA/IWEA Welcome Reception was a success once again. Thanks to our many sponsors and all other members who worked the phones, emails and sign-in table to make this event a success. This year's event, held at the Hilton Chicago, was the 23rd year that CSWEA and IWEA joined to host this event. An impressive turnout of over 500 members, sponsors, and friends were in attendance. There was food and drink aplenty and the noise level was high as friends met and made plans for the week of WEFTEC. Of course, this was all made possible by our generous sponsors. Even with the great turnout their donations allowed us to sustain our thirsty members and still nearly break even for the event. Make a note now to plan to attend the 24th Annual Welcome Reception at WEFTEC 2018 in New Orleans! CS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- Weir Speciality Pumps (WEMCO)
- Xylem Inc.

Click HERE to return to Table of Contents

Andrew Szymaszek, Linjie Tang, and Megan Wolfe represented CSWEA at the WEFTEC design competition.

WEFTEC STUDENT DESIGN COMPETITION

Central States was once again well represented at the WEF Student Design Competition at WEFTEC 2017 in Chicago.

CSWEA developed the competition criteria based on WEF guidelines and Student chapters were notified of the competition during the fall semester of the 2016-17 school year. The Student Design Competition is intended to promote real-world and hands-on design experience for students interested in pursuing an education and/or career in water/wastewater engineering and sciences field. There are two levels of the WEF competition, conventional wastewater design, which includes traditional wastewater design projects, and environmental design, which includes contemporary engineering design topics such as sustainability, water reuse, wetland construction and Engineers Without Borders projects. However, CSWEA also holds a third category for the Global Water Stewardship project.

CSWEA had four entries in the GWS category of the competition, which was held the day before the Education Seminar in Madison last April. The University of Wisconsin-Platteville had two teams in the competition and the Milwaukee School of Engineering and University of Illinois Urbana-Champaign each had one. The results was a near tie between the University of Wisconsin-Platteville team consisting of Megan Wolfe, Linjie Tang, Andrew Szymaszek, and Catherine Terando and the Milwaukee School of Engineering team of Lila Johnson, Karissa Brunette, Guissel Davila, Nicholas Kallmyer and Finn Finucane presenting their projects "Global Water Stewardship – Dominical, Costa Rica." Ultimately the team from UW-Platteville was found to be the winner but members from both teams were offered to accompany CSWEA members to Costa Rica over the summer to assist with site investigations for next year's problem statement.

The winning team from UW-Platteville presented their project at the WEF competition held during WEFTEC where they faced stiff competition from schools throughout the country. Unfortunately the team's hard work and exceptional presentation did not result in victory, but they did a great job and should be very proud of their accomplishment as we should be proud in having them represent CSWEA. CS

OPERATIONS CHALLENGE

By Chris Lefebvre, PWO Representative

The 30th year of Operations Challenge was held this year at WEFTEC 2017 in Chicago, IL. This year was the largest competition ever with 44 teams from four countries. CSWEA once again sent two teams to the annual competition. The Shovelers and Pumpers got the pleasure of competing against the best teams from around the world. Most of the teams that compete at this level are comprised of members from one facility and their team rosters rarely change. These teams start practicing multiple times per week in early spring and compete at regional competitions to hone their skills. CSWEA's team rosters weren't finalized until July and are composed of competitors from three states. The first time the teams actually met in person wasn't until mid-August and then they had a total of four days to practice together before arriving in Chicago for the competition. Needless to say, our teams are definitely underdogs in the competition.

The teams were able to meet for two, two-day practice sessions at the City of Janesville's WWTP. During these meetings each event was broken down into specific roles and practiced. The competitors watched their counter parts from the other team practice and then critiqued each other. This method of practicing allowed both teams to perfect their roles quickly and effectively. Coaches Jim Miller and Tom Dickson along with "Lab Guru" Brian Skaife provided fantastic support to the teams during this process. The competitors then took what they learned home and practiced their roles for each event.

Once the teams assembled in Chicago it was very clear that the competitors had done their homework. During the competition this group of underdogs got the attention of the rest of the teams by posting three top-ten event scores between the two teams. The Shovelers finished in seventh place on the Process test and the Pumpers took first place on the Process Test and in the Laboratory Event.

Click HERE to return to Table of Contents

It continues to amazes me how our teams' rosters constantly change but the teams consistently compete at a high level. I would like to thank everyone who supported this great group of individuals. Without help from CSWEA and the State Sections, the City of Janesville WWTP staff, our generous sponsors, and the best cheering section at the competition, none of this would have been possible.

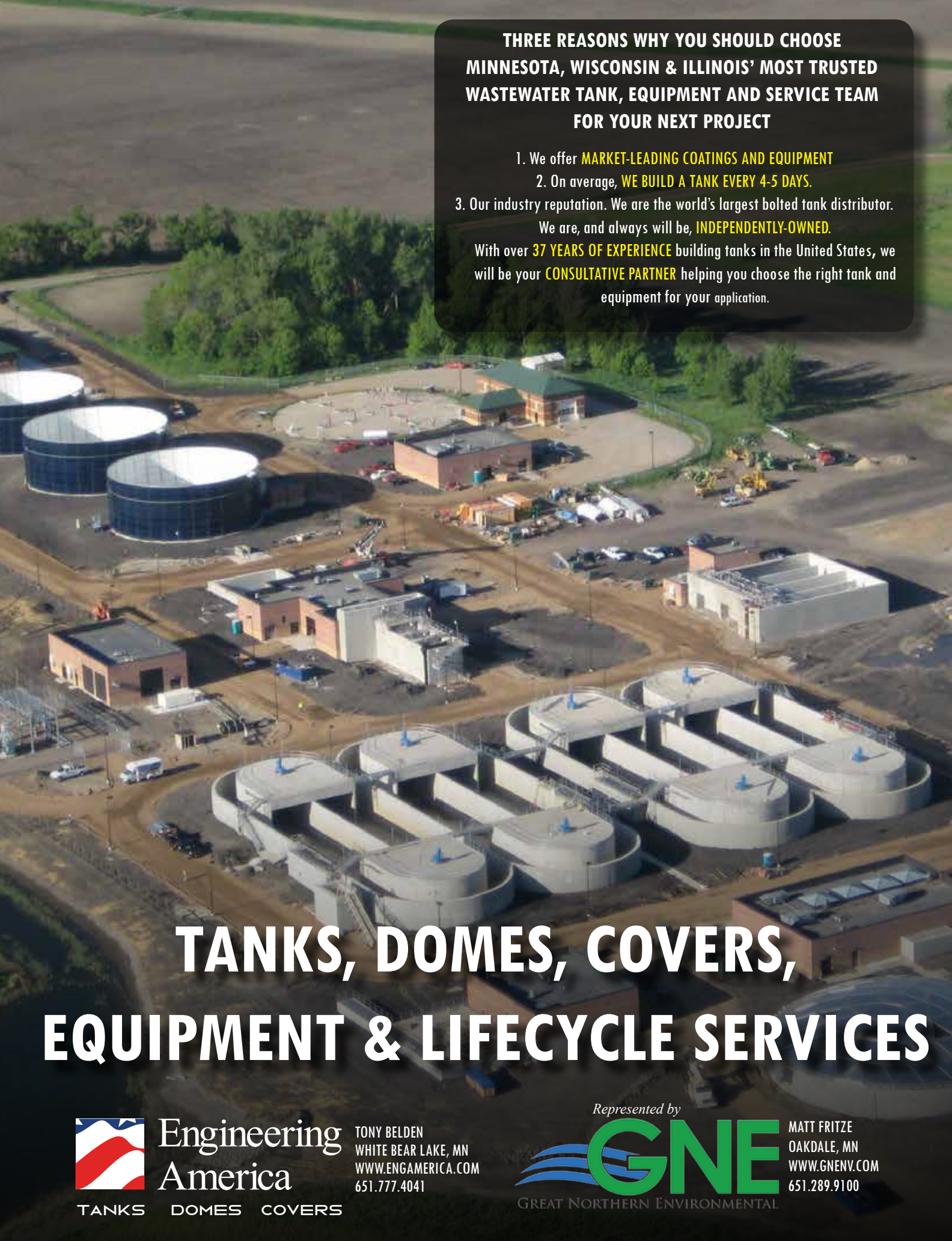
2017 TEAM ROSTER

CSWEA Pumpers

- Matt Streicher (Captain) – Glenbard Wastewater Authority, IL
- Jerod Gable – City of Duluth, MN
- Brent Perz – Baxter and Woodman, IL
- Wade Lagle – Urbana & Champaign Sanitary District, IL
- Tom Dickson (Coach) – Oconomowoc, WI

CSWEA Shovelers

- Jason Neighbors (Captain) – Glenbard Wastewater Authority, IL
- Marc Zimmerman – Janesville Wastewater Utility, WI
- Zach Matya – RJN group, IL
- Luke Markko – Village of Wauconda, IL
- Jim Miller (Coach) – Wenck Associates, MN CS



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Cedar Rapids Water Pollution Control Facility

Successful Recovery of a Solids Management System from a Catastrophic Flood

By Lloyd Winchell, Brown and Caldwell; Roy Hesemann, City of Cedar Rapids; John Ernst, City of Cedar Rapids; and David Sapp, Brown and Caldwell

INTRODUCTION

The City of Cedar Rapids (City) owns and operates the Cedar Rapids WPCF treating approximately 47 MGD (million gallons per day) of domestic and industrial flow on average. The WPCF serves about 180,000 people in the Cedar Rapids area and nine major industries. In June of 2008 the WPCF was inundated by catastrophic flooding that spread across the states of Iowa and Wisconsin. Total damages from the flood tallied several billion dollars within the local affected area. Brown and Caldwell provided emergency assistance in assessing and designing repairs to the solids processing facilities including the low pressure oxidation (LPO) system that is coupled to the multiple hearth incinerator (MHI). An emergency project was initially conducted to restart the damaged incinerator with reduced capacity followed by a more substantial repair project to provide an additional minimum five years of service life. Given the magnitude and extensive damage caused by the flooding in the region, the Federal Emergency Management Agency (FEMA) provided support including funding for the two phased repair projects related to the solids processing system.

During the final repair construction phase the Environmental Protection Agency (EPA) introduced new emissions guidelines for sewage sludge incinerators (SSIs) that classified sewage sludge as municipal solid waste (MSW). The reclassification brought SSIs under Section 129 of the *Clean Air Act*, or commonly called "MACT" for the maximum achievable control technology basis of the rule. An evaluation of historical repair costs to the existing incinerator did not exceed the financial threshold that would have triggered more stringent emissions requirements be met under the new MACT rule. Upon testing, it was confirmed the repaired incineration system could meet the new applicable emissions standards without need for additional capital improvements.

FIGURE 1. Normal Cedar River levels in downtown Cedar Rapids (left) and height of 2008 flooding (right), Veteran's Memorial circled for comparison.

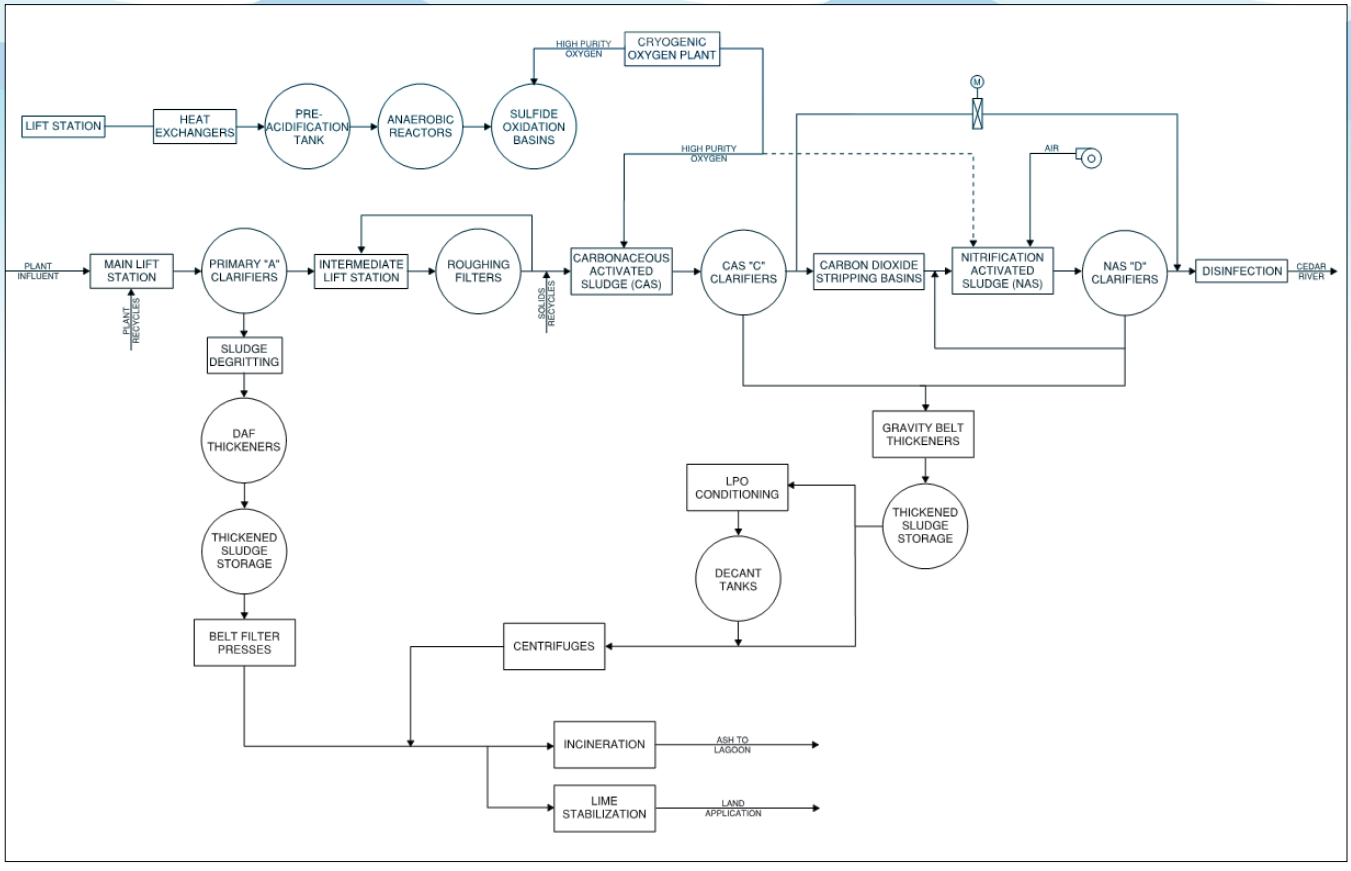


FIGURE 2. Cedar Rapids WPCF Treatment Schematic.

FLOOD OF 2008

During the summer of 2008 the Midwest experienced significant and in some places catastrophic flooding in the Mississippi River basin, including its tributaries. The following summary of the meteorological conditions from the National Oceanic and Atmospheric Administration highlights what unique conditions led to the flooding (Gleason, 2008). Precipitation in the Upper Mississippi Basin from December 2007 thru May 2008 was the second wettest on record for that period. The month of June 2008 recorded 15.31 inches of rainfall in the state of Iowa, the highest total on record.

The Cedar River, which runs through the heart of the city, began to flood on June 9. The river crested on June 13 at 31.12 feet, or 12 feet above flood stage, the previous record river crest on two occasions was 20 feet and is considered to have exceeded estimated 500-year levels. Figure 1 is an aerial photograph of downtown Cedar Rapids at the height of the flood compared to normal river levels.

FIGURE 3. Normal Cedar River levels at the WPCF (left) and height of 2008 flooding (right).

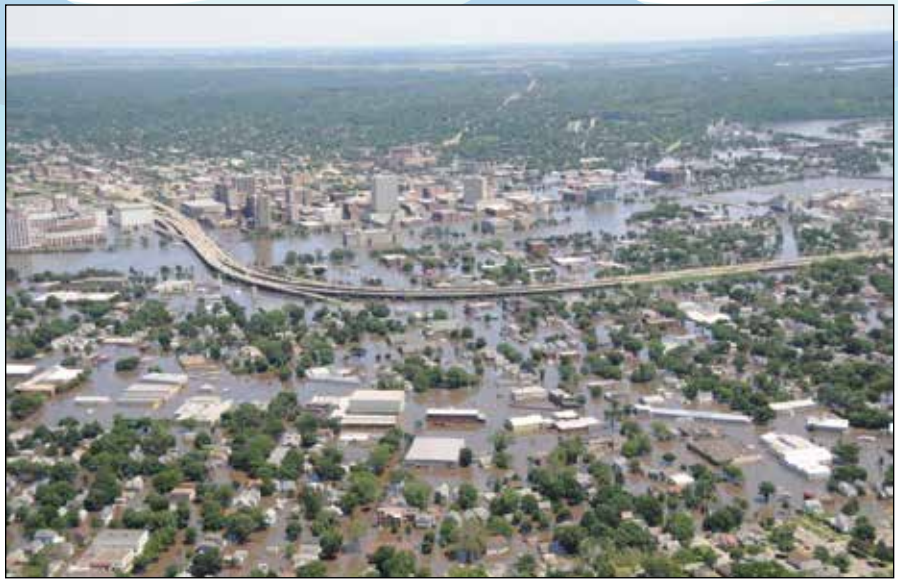
Click HERE to return to Table of Contents

UNUSUALLY COMPLEX TREATMENT PLANT

The WPCF was largely built in the mid-1970s. The unique characteristics of the influent wastewater required a complex strategy for treatment. The treatment processes are depicted in Figure 2.

The liquid treatment process consists of primary sedimentation followed by roughing filters, two-stage high rate pure oxygen activated sludge for carbon and nitrogen conversion, and disinfection. A separate influent waste stream enters through a high rate anaerobic process that pretreats certain high strength industrial wastewaters before discharging to the activated sludge process. The anaerobic process employs an upflow anaerobic sludge blanket (UASB) reactor with a granular sludge for carbonaceous biological oxygen demand (cBOD) reduction. Reduced sulfur compounds are oxidized in aerated basins and the biogas produced is treated in a biological scrubber.

Primary sludge is degritted and screened prior to concentration by dissolved air flotation thickeners which have recently achieved 4% total solids (TS). The thickened primary sludge is dewatered with belt filter presses to 27% TS. Excess secondary sludge produced from biological treatment is concentrated by gravity belt thickeners to about 5% TS and is conditioned with three trains of LPO thermal conditioning with decant thickening for a concentration of approximately 10-15% TS. The thickened and thermally treated secondary sludge is dewatered with high solids centrifuges to 30-40% cake solids.



The separate solids streams are combined on the feed conveyor to a single MHI, or back-up alkaline stabilization process. The incinerator is 25 feet in diameter and includes seven hearths. Biogas from the UASB provides a large percentage of the required supplemental fuel to operate at the desired temperatures. A waste heat recovery boiler was also part of the original construction, providing steam for the LPO system. The overall wet mass reduction from cake feed to ash is approximately 80%.

FLOOD IMPACTS AND DISPOSAL LIABILITY

The WPCF was flooded from June 12 through 18, 2008. Figure 3 displays two aerial photographs of the WPCF, one during normal river levels and the second at the height of the flood. The incineration building itself was flooded on June 12.

During the flooding the incineration building was inundated with approximately 15 feet of water in the basement and ground floor levels. Water entered through a storm water drain system in the basement tunnel of the solids handling building. Due to the rapid rise of the river, failure of the gauging station upstream, inability to accurately predict a river crest

of such historic levels, and the loss of power to the facility, the incinerator was inundated before it could be properly shut down and cooled. Several components of the incineration and LPO system were submerged fully or partially from the flood.

Other components were not submerged but were subjected to undesirable conditions because of the flood and rapid cool down. Several pieces of equipment were subjected to an emergency shutdown and then sat idle in the flooded building for several days and a very humid building for months as staff and contractors performed emergency cleanup in virtually all areas of the treatment plant.

Average wet cake production before the flood was approximately 260,000 lb/d. Disposal liability increased dramatically after the flood. While primary solids dewatering continued as before and were operational by July 17, 2008, secondary sludge production had to be dewatered on the centrifuges without LPO heat treatment. Centrifuge cake solids decreased from 33 to 19%, and with substantially greater polymer consumption. Total wet sludge cake production increased to approximately 650,000 lb/d. The incinerator was brought back online on March 31, 2009 but could not handle the full cake solids load. The LPO system came back online in August of 2009, allowing the incinerator to handle both primary and secondary loads. Between the time the WPCF restarted treatment after the flood and when the incinerator and LPO systems were back on line a total of 7,500 wet tons of solids were hauled off site to multiple landfills and some 79,400 wet tons were land applied. This compares to a typical post flood year which requires about 2,700 wet tons, or approximately seven percent of the solids produced annually, of solids to be hauled off site because the incineration and/or LPO are offline for maintenance. Total costs for hauling and tipping fees between the flood and when the LPO system was brought back online in August of 2009 total $1.6 million.

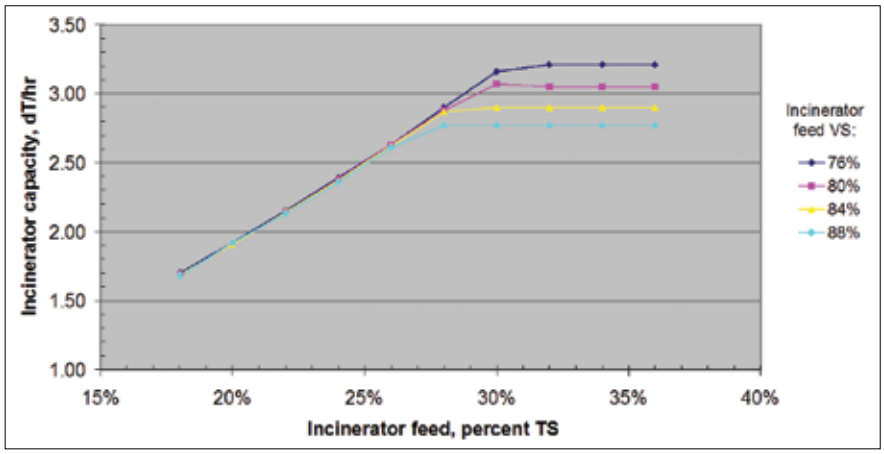


Figure 4. Incinerator capacity as a function of cake water content and volatile solids.

INITIAL EMERGENCY ACTIONS

Given the high cost of off-site solids disposal the City determined that the existing flood damaged solids treatment system should be brought back to service as soon as possible. An initial Emergency Repairs project was instituted to re-start the incinerator at a reduced capacity and reliability to process primary solids. Funding for this project was obligated by FEMA. Repairs to the alkaline stabilization system also allowed secondary centrifuge cake processing for land application.

A contractor initiated repairs in mid-November of 2008. As noted earlier the incinerator was operating again by the end of March 2009. Alkaline stabilization of centrifuged solids was continued another five months due to repairs and reactivation of the LPO system. The Emergency Repairs project related to the solids system totaled $2.2 million in construction costs and included the following scope:

- Incinerator center shaft drive maintenance and motor, VFD, and local control panel replacement
- Incinerator center shaft cooling fan testing and motor replacement, two units
- Incinerator feed screw valve and actuator replacement
- Incinerator roll crusher motor replacement and crushing roller repair
- Incinerator refractory and shell repairs
- ID fan testing and duct rehabilitation (operated without VFD)
- Sludge combustion air fan rotating assembly and motor replacement
- Burner combustion air blower bearings, belts, motor for two units
- Waste heat boiler soot blowers and ash discharge chute replace, water side pressure tested and relief valves replaced
- Natural gas and biogas pipeline testing and component replacement
- Ash pump service and motor replacement for two units, pipeline cleaning
- Scrubber cleaning and inspection
- Alkaline stabilized sludge conveyor enclosure and duct replacement
- Plant air compressor replacement
- Miscellaneous PLC and electrical cabinet repairs

Table 1. Final Repairs Project Scope

Scope Item	Repair Scope	Basis
Incinerator		
Burners (9)	Replace existing with new	Reliability and emissions.
Burner Combustion Air Fan (1)	Replace existing with new	Repaired unit from emergency project developed vibration and determined not reliable.
Waste Heat Boiler	Abandoned in place	Deemed a safety concern, excessive costs and difficulty to repair.
Vapor Power Boilers (2)	Rehab and controls	Dedicated to LPO, replacing waste heat boiler. Required controls improvements for reliability.
Auxiliary Boiler (1)	New	Sized to meet ancillary steam demands of building heat and deaerator so vapor power boilers can be dedicated to LPO.
Wet Scrubber	Modified with multiple venturi drop and quench sections	System partially flooded. Existing unit marginally passed emissions test prior to flood, partially replaced with more modern technology.
ID Fan	Replace existing with new	Existing fan adversely impacted during emergency repair use. Added pressure drop from modified scrubber and operation at optimized flue gas flows.
Emergency Bypass Stack	Seals and actuator replacement	Reliability and safety.
Motor Control Center	Replace existing with new	Existing unit inundated by flood and repaired minimally for short term operations.
PLC (5)	Rehabilitate one, four new	New equipment PLCs.
LPO		
Heat Exchanger Bundles (3 trains)	Replace top end of third exchanger	Reliability and integrity compromised from emergency shutdown and long outage.
Process Air Compressor No. 2 (1)	Replace primary and booster compressors and air dryer	Unreliable from age and prolonged outage during flood recovery.

Table 2. Reimbursed Flood Recovery Costs of Solids Handling Facilities at WPCF

Expense	Cost (million $)
Emergency Repairs	$2.2
Short Term Repairs	$7.9
Sludge Hauling/Disposal	$3.6
Engineering	$2.2
Total (reimbursed by FEMA)	$15.9

RESTORATION OF SYSTEM CAPACITY

The primary justification for FEMA support of the solids system repairs was to restore the pre-flood capacity of the overall solids handling process. While the emergency repairs restored partial incinerator operation, the LPO system was still

Table 3. MACT "Existing" Classification Cost Basis for Cedar Rapids WPCF SSI

Category	Cost (million)
Original costs of SSI (current value)	$8.0
50% of original costs (current value)	$4.0
Cumulative costs of certain equipment replacements and changes	$1.2

Table 4. MACT Emissions Compliance Trial Results (November 18-19, 2014)

Pollutant	Units (at 7% O2)	Emission limits, "existing" MHIs	75% of Emission limits, "existing" MHIs	Run 1	Run 2	Run 3	Average of Runs
Cd	mg/dscm	0.095	0.071	0.016	0.024	0.021	0.020
PCDD/ PCDF, TEQ	ng/dscm	0.32	0.24	0.0072	0.0057	0.017	0.0099
PCDD/ PCDF, TMB	ng/dscm	5.0	3.8	1.0	0.70	1.7	1.1
CO	Ppmvd	3,800	2,850	5.0	21	8.7	11.5
HCl	Ppmvd	1.2	0.90	0.20	0.58	0.32	0.37
Hg	mg/dscm	0.28	0.21	0.044	0.046	0.043	0.045
NOx	Ppmvd	220	165	48	62	49	53
Pb	mg/dscm	0.30	0.23	0.055	0.061	0.071	0.062
SO_2	Ppmvd	26	20	0.45	0.71	1.7	0.95
PM	mg/dscm	80	60	16	13	19	16

> "The original scrubber system was partially damaged by the flood, which led to considering repair or replacement."

quite unreliable and was experiencing a significant number of outages.

The LPO system provides solids oxidation and solubilization while enhancing dewaterability of the product sludge which was the driver for its construction in the 1970s and is a significant component for the preprocessing of sludge before incineration. Without the LPO, the excess water in the secondary solids reduces the overall incinerator capacity to a fraction of the prior and needed capacity.

The relationship of the incinerator capacity to the applicable range of cake solids and volatile contents is presented in Figure 4. Capacity is controlled by cake solids content until the cake is sufficiently dry. Thereafter capacity depends on volatile solids or heat content. Capacity is optimized when LPO is applied and combined cake solids are typically to the right of the knee of the curves. Because of all the industrial contributions and the complexity of the treatment process, the volatile solids (VS) content of combined cake feed can vary over the indicated 76 to 88 percent range. Incinerator capacity can therefore vary from 2.8 to 3.3 dry tons (dT) per hour.

The original scrubber system was partially damaged by the flood, which led to considering repair or replacement. The particulate emissions test before the flood demonstrated the existing scrubber was close to the regulated limit and a reliable system would be imperative. Given the need for repair of the incinerator air flow system as well, replacement was selected as the preferred option. While the original solids handling installation had not been significantly modified during more than 30 years of service prior to the flood (except as required for maintenance), there have been changes in regulations. There are two guiding regulations for sewage sludge incineration:

- 40 CFR 60 Subpart O
- 40 CFR 503 Subpart E

Subpart O is the ground floor of sludge incineration regulations, with three thresholds of particulate matter (PM) emissions per dry ton of sludge incinerated:

- Less than 0.75 lb/dT requires monitoring of both the pressure drop across the wet scrubber and the wet oxygen concentration in the furnace outlet
- Between 0.75 lb/dT and 1.30 lb/dT requires additional monitoring
- Above 1.30 lb/dT is unacceptable

The original Subpart O PM requirements concerned total particulate matter.

Later, the size of PM subject to permit control was defined as "PM10", which means particulate matter with an aerodynamic diameter of up to 10 micrometers. Control based on PM10 became a permit criterion in 1987. The removal efficiency of a wet scrubber is typically associated with pressure drop. Generally the smaller the particle size removed, the greater the pressure drop required. Compliance with current Subpart O particulate removal standards for sewage sludge incinerators generally requires pressure losses of 30 in W.C. or higher (Water Environment Federation, 1992).

The 503 Standards for the Use or Disposal of Sewage Sludge were implemented in the 1990s. Subpart E imposed limits on total hydrocarbon (THC) emissions from sewage sludge incinerators. At that time there was no monitoring equipment available to measure THCs so the City was allowed to monitor carbon monoxide (CO) as a surrogate, to a limit of 100 ppmvd. The 503 rule also required evaluation of risk-specific metals, with which WPCF demonstrated compliance in 1993.

In addition to the pollutant limitations discussed above, limits for sulfur dioxide (SO_2) and nitrogen oxides (NOx) are included in the Title V permit. The mass emission rate limit for SO_2 is permitted at 9.0 lb/hr while NOx is 7.4 lb/hr.

The last formal emissions test was conducted before the flood, in July 2007. PM10 emissions were measured at 1.28 lb/dT, nearly the permitted limit. The test results barely met the maximum emission requirements and the components that have been identified as limiting better performance were related to the scrubber and ID fan. Specifically, the fan was unable to generate the scrubber differential pressure necessary for optimal PM10 removal and the scrubber was not originally intended to control PM10. To restore reliability, comply with the regulations at the time of the flood and to provide a reasonable design margin of safety the impacted equipment required modification/replacement, specifically the scrubber and the ID fan.

FINAL REPAIRS PROJECT

As part of the FEMA funded repairs to the solids handling system a second repairs project was (Final Repairs) conducted. The goal of the project was to provide reliable operation for the next five or so years until a new FEMA obligated solids processing facility was in place. Construction began in the fall of 2010 and was completed in the spring of 2012. The scope of the project is generalized in Table 1.

Ultimately, obligated funds for a replacement incinerator and most of the indirectly damaged components were de-obligated by FEMA at the same time Final Repairs were under contract and under construction. The City successfully appealed the decision by FEMA and was provided the funds for all the Emergency Repairs and most of the Final Repairs, as well as sludge disposal costs.

The Final Repairs project cost the City a total of $8.3 million in construction, while FEMA reimbursed $7.9 million. When combined with the Emergency Repairs project and sludge hauling/disposal costs due to the flood are summarized in Table 2. These costs were reimbursed by FEMA, and all told FEMA reimbursed $89 million dollars of recovery efforts at the WPCF (City of Cedar Rapids).

MACT 129 COMPLIANCE

On March 21, 2011 the EPA published the "Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units", commonly referred to as the MACT rule. The new rule brought SSIs under Section 129 of the Clean Air Act with more extensive emissions limits and monitoring requirements. Compliance with the MACT rule was required by March 21, 2016.

The City engaged Brown and Caldwell, with Black and Veatch as a subcontractor, in February of 2013 to establish the existing facilities performance, identifying any required capital improvements, and aid in conducting formal compliance trials and reporting results. Initial stack testing trials in October of 2013 indicated the facility would meet MACT emissions requirements for an existing incinerator.

Although no capital improvements were required to meet emissions limit a smaller exhaust stack was installed to provide better conditions for real time flue gas flow measurement and emissions monitoring.

Another key consideration of the MACT rule is whether an incinerator is considered "new" or "existing". The difference between

"new" and "existing" is distinguished by 1) construction commenced on or before October 14, 2010, or 2) significantly modified specific components falling under the limits to the EPA SSI definition exceed 50 percent of the original installation cost (see EPA, EPA-HQ-OAR- 2009-0559 for more detail on the modification stipulations). Table 3 lists the costs considered for the WPCF and shows that the system was still considered an "existing" MHI.

In November of 2014 the MACT compliance trials were completed at the WPCF. Three runs for each emissions parameter were completed in accordance with the MACT rule. Table 4 summarizes the results compared at the emissions limit and 75% of that limit. Not only does the WPCF SSI meet the MACT compliance for all pollutants but is under the 75% threshold which reduces the compliance testing requirements. The MACT rule states that if a facility measures less than 75% for any pollutant for two consecutive years, that pollutant does not have to be measured for the next two years but must be measured within 37 months of the last test. This will result in a significant cost savings for the City.

It should be noted that the 7.4 lb/hr NOx mass limitation of the Title V permit is equivalent to 77 ppmvd corrected to 7% O_2 and at 85 percent of capacity (3.0 dT/d). The performance testing indicates that such lower NOx levels are also achievable and in compliance with the Title V permit.

CONCLUSION

The Cedar Rapids sludge processing system was successfully rehabilitated following catastrophic flood damage in 2008. Although not anticipated at the time of repairs, the system's performance has proven to be fully compliant with the new MACT rule for "existing" MHIs while operating at greater than 85% of capacity, and has demonstrated emissions control comfortably below 75% of the limit for all parameters which will allow reduced monitoring and associated cost in the future. Thus, Cedar Rapids has a valuable sludge disposal asset which should provide cost-effective and environmentally compliant service for the foreseeable future.

The value of reliable and environmentally compliant sludge disposal is easily understated for a wastewater agency such as Cedar Rapids. Because the City has a large industrial load, its sludge production is equivalent to a population center several times as large. The current MACT compliant LPO/incineration asset will provide the time required for prudent consideration of future sludge management practices.

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Northeast Plant

Urbana & Champaign Sanitary District

The History of Wastewater Treatment

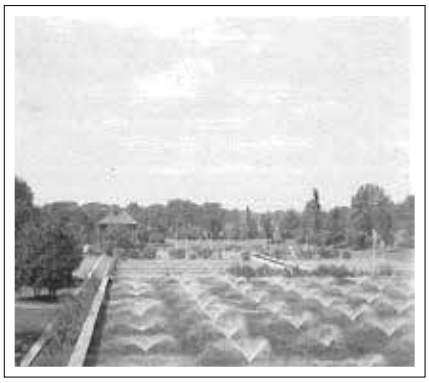
BACKGROUND

The Urbana & Champaign Sanitary District (UCSD) serves the central Illinois communities of Urbana, Champaign, Savoy and Bondville, giving it a service population of 155,000 including the 45,000 students of the University of Illinois. Since UCSD's first engineer and manager was **Gus Radebaugh**, obviously there is a rich history of wastewater treatment at UCSD.

In the 1920s, his generation of leaders established a very sound foundation for our industry. First, they guided the establishment of their own Sanitary Districts and the construction of their own treatment plants. Then, they followed that up by helping to create important local and regional organizations that became the Central States Water Environment Association, the Illinois Association of Wastewater Agencies, and the Illinois Association of Water Pollution Control Operators. It is not an accident that some of these Midwestern organizations are older than the national versions.

Staff Photo

For the second half of our plant profile, we thought we would cover a little bit of the history that generated the treatment plants we enjoy operating here in 2017.



Trickling Filter at NEP: The 1924 image shows the flow at a maximum rate.

Trickling Filter at NEP: The 2016 image shows the flows just starting to increase.

The Present:

UCSD employs 50 staff. About two-thirds of the staff has a license or certificate of training in their area of expertise. They operate and maintain two treatment facilities, 40 miles of interceptors, and 28 lift stations. The individual communities and the university own and maintain their local collector sewers. Funding for the operation and maintenance of UCSD facilities comes from a per-gallon user fee. The District left the property tax bills in the 1980s. Expansion projects and installation of new technology are both funded from the impact fees charged to new construction and rebuilt homes or businesses.

The Northeast Plant (NEP) treats an average of 14 million gallons per day (MGD) and the Southwest Plant (SWP) treats an average of 6 MGD. The Northeast Plant receives the majority of the industrial flow, including the flow from a large industrial food manufacturer with pretreatment. The SWP treats domestic and light-commercial sewage almost exclusively. All solids processing takes place at NEP with the thickened waste activated solids from SWP and the food manufacturer being trucked to NEP. The solids processing includes gravity belt thickening, anaerobic digestion, dewatering via centrifuges, and land application to farmers' fields. The NEP also receives other trucked wastes, including those from restaurant grease traps, septic tanks, portable toilets, bus and mobile homes, and leachate from a municipal landfill.

The digestion process generates enough biogas to run one or two combined-heat-and-power generators (co-gens) continuously. This produces an average of 350 kW, or roughly 30% of the electrical needs of NEP. The heat from the co-gens provides more than enough heat to heat the digesters in a typical year. The value of biogas for plant processes is not a recent discovery for UCSD. The first biogas-driven engines were installed in the 1950s. These were used to drive the aeration blowers.

Besides the solids handling, the other major difference between the plants is that SWP performs biological phosphorous removal using the A/O Process. The yearly average effluent P level is 0.3 mg/L, well below the permit requirement of 1.0 mg/L.

Both plants use excess flow clarifiers to treat the high flows that occur during storms. A recent innovation at NEP is the use of 10 MGD of unused primary clarifier capacity to pretreat the influent prior to any flow being sent to the excess flow clarifiers directly. This double dose of settling improves the capture of the first flush of solids seen from storms. A coagulant to aid settling of solids is fed along with sodium hypochlorite into the influent of the excess flow clarifiers. Any remaining residual chlorine is neutralized using sodium bisulfite prior to discharge into the receiving stream.

The large student population regularly impacts the NEP. During school breaks, the migration of 40,000 students over the course of a few days changes everything. Staff adjusts process flows in anticipation of the decrease and increase in loadings. Mixed liquor solids concentrations are monitored closely and wasting rates are adjusted as needed.

Another somewhat unusual feature of UCSD is the fixed nozzle trickling filter that has been in continuous operation since November of 1924. This was originally referred to as a sprinkling filter. It is 1.6 acres in area with a rock depth of 10 ft. The trickling filter and its associated clarifiers can be used as a parallel secondary treatment line, or as a roughing filter with the effluent recirculated back through the activated sludge process. Although over 90 years old, the trickling filter can outperform activated sludge during the summer months. Unfortunately, performance decreases markedly in the winter due to the large surface area and the cooler temperature of the sewage flowing over the rocks.

The activated sludge aeration basins are only designed to treat carbonaceous biochemical oxygen demand (C-BOD) and have a short detention time of 2.3 hours at design average flow. Nitrogenous biochemical oxygen demand (N-BOD) is designed to be treated in the nitrifying towers.

Most recently, staff has experimented with operating the aeration basins in a modified biological phosphorus removal mode. In this mode, the first aeration tanks are operated in an anaerobic mode and the remaining tanks are run at low dissolved oxygen. This has resulted

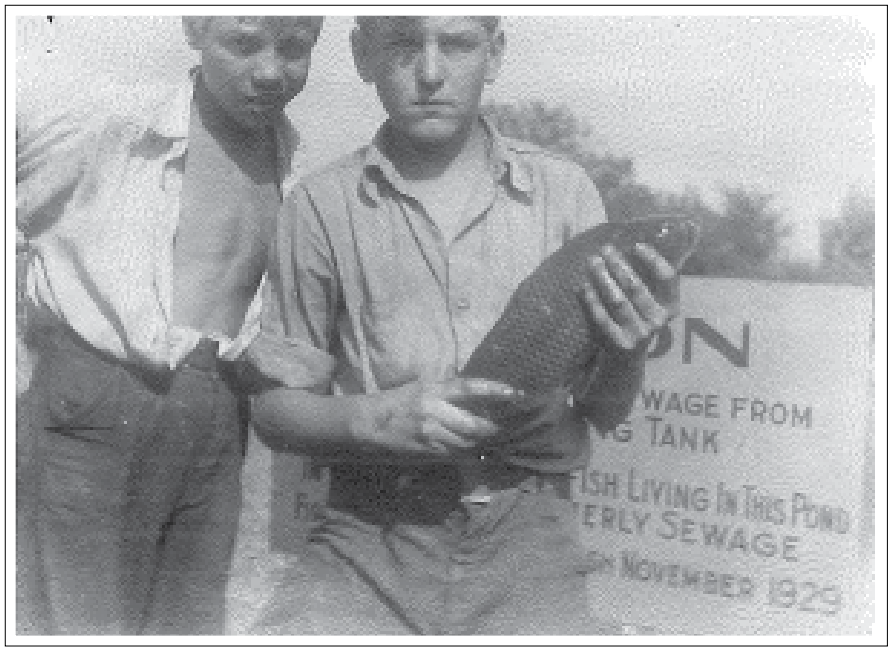
Click HERE to return to Table of Contents

Dr. Bartow's activated sludge experiment, 1913.

in the removal of up to 75% of total phosphorus during normal flows, resulting in concentrations of between 1.3 and 2.0 mg/L phosphorous on most days. Also, the total nitrogen has been reduced due to the increased denitrification that is now occurring in the aeration tanks.

It should be noted that the NEP does not have a phosphorus limit and the aeration basins are not designed for phosphorus removal. So when performance of the overall plant begins to degrade, we return to conventional operation. However, the voluntary phosphorus removal and denitrification produces the ancillary benefit of better settling activated sludge solids, which contributes to a higher quality secondary effluent.

The very tall nitrifying towers make both UCSD plants somewhat unique. The plastic media trickling filters are placed after secondary treatment. Their purpose is to host a large population of nitrifers to efficiently and reliably allow nitrification to occur after activated sludge has removed



The catch of the day from the NEP Final Settling Tank in 1931.

the C-BOD. This has produced more stable nitrification operation over the years with very small aeration tanks. Effluent ammonia concentrations over the last year averaged under 0.1 mg/L at SWP and 0.3 mg/L at NEP.

But, that's not how it's always been…

The PAST: The early years, up to 1916

Prior to 1894, no sanitary sewers or wastewater treatment plant existed in the Urbana- Champaign area. Most homes were without bathrooms and primitive outdoor privies were numerous. As a result, conditions in closely built-up neighborhoods became unbearable. Public sentiment was aroused and a movement was made to construct sanitary sewers first in Urbana and then in Champaign. However, because there was no continuously flowing river nearby, conditions in the nearby creek were still horrible, especially in dry weather. It was a septic mess for miles downstream.

Professor Arthur N. Talbot of the University of Illinois was put in charge of the design and construction of the work in 1894 and began to evaluate what method of sewage treatment would be added after the sewers. He designed a large sewage settling tank which was placed into service in November of 1894, concurrent with the new Urbana sanitary sewer system. This was essentially a community septic tank. It was located at the site of the current Northeast Plant. A second generation settling tank was built on the same site when the Champaign sewer system was built. That was placed into operation in November of 1897. It was believed both were among the first of their kind in the United States. The larger tank was 37 feet long, 16 feet wide and 7 feet deep, giving it a treatment volume of 30,000 gallon. The tank was enclosed in a brick building and a centrifugal pump powered by a steam engine was provided for periodically pumping out the settled solids into a shallow earthen pit.

A study was made of the chemical and biological action occurring and the nature of the effluent. Articles about the plant were published in early engineering journals. Many engineers and city officials visited the plant to inspect its operation. For a few years, these two tanks proved to be very useful and met their intended purpose. However, with the rapid growth of the two towns and heavier usage of the sewer systems, the original tanks became inadequate.

During the period between 1913 and 1916, Dr. Edward Bartow and his associates from the University of Illinois carried out experiments on the first continuous-flow, activated sludge process in this country. The results obtained here were confirmed by other investigators in the United States, Canada, and England. While the activated sludge process was not initially selected for the further treatment of sewage in Urbana and Champaign, the work conducted in Urbana helped pioneer the waste activated sludge process and provided valuable information to engineers and municipal authorities considering the use of this process.

1917-1930s

While the need for better sewage treatment was becoming more and more apparent, the laws of the Illinois prohibited cities or communities from incurring bonded indebtedness above a certain sum. Most of the communities in the state were already bonded to the limit. Essentially, the communities faced a real need, but also had a tax cap that did not allow them to provide services beyond what they already were doing. In 1896 legislation permitting specifically the formation of what is now the Metropolitan Water Reclamation District of Greater Chicago was passed. In 1911, similarly specific legislation allowed the North Shore Water Reclamation District to come into existence. This agency serves the communities north of Chicago. In 1917, the State Sanitary District Act of 1917 allowed UCSD and other agencies across Illinois to come into existence. These single-purpose governmental bodies were charged with the task of cleaning up their community's sewage and thereby protect the residents' health.

On May 21, 1921, in response to a petition from large groups of citizens, Urbana and Champaign voters went to the polls to establish the new Urbana & Champaign Sanitary District. The proposal was approved 443-370, with Champaign voters generally favoring it and Urbana voters opposing it. There is some chance that the vote reflects a NIMBY attitude of that era since Urbana was the downstream community and known to be the expected site for the new treatment plant.

Click HERE to return to Table of Contents

More than a year later the UCSD Board of Trustees proposed a $500,000 project to build new sewers and a sewage treatment plant for both Champaign and Urbana. The sewage treatment plant would be built for a potential residential population of 75,000. This was expected to be adequate for the communities through 1940.

The bond issue was approved November 28, 1922, by a margin of 1,439 to 518. It was estimated that it would cost the typical residential property owner no more than $5 a year (approximately $70/year in 2017 dollars). Construction of the plant at 1100 East University Avenue in Urbana began in May of 1923. The original district included an area of 8.56 square miles, serving a population of approximately 30,000, including the University of Illinois.

The new treatment plant was dedicated on November 21, 1924. It consisted of screening and grit removal, Imhoff (primary settling) tanks, fixed nozzle sprinkling (trickling) filters, final settling tanks, and sludge drying beds – the best available technology at that time. During the dedication ceremony, Dr. Talbot stated that:

"It should be understood that the plant will require intelligent operation and maintenance. The community of Urbana and Champaign in this step has taken on the duty which a civilized people owe to civilization – to make proper disposition of its wastes."

The strong emphasis upon operations and maintenance was at least partly attributed to the experience from the original septic tanks. They failed after the regular cleaning of the solids was stopped.

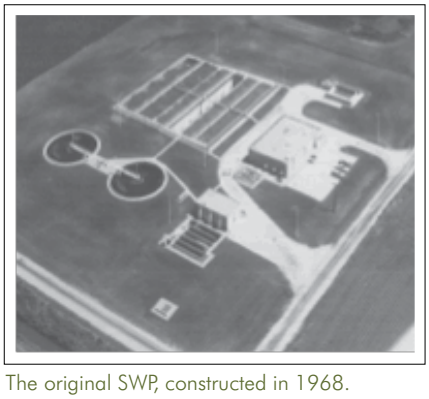
1940s-1980s

As anticipated, population growth continued in the communities into the 1940s. The 1945 expansion project included a rectangular primary sedimentation tank and an anaerobic digester. Between 1945 and 1957 an additional grit tank, a second anaerobic digester and additional sludge drying beds were constructed.

In 1957, NEP was further expanded to accommodate an increasing population and industrial development. This construction included an additional primary sedimentation tank and the conversion of the original Imhoff tanks into aeration tanks for the newly installed waste activated sludge process. Also included were secondary clarifiers, two more anaerobic digesters, and engines using the digester gas to drive blowers for supplying air to the aeration tanks. This version of "green" technology was chasing the original green color of US dollars.

As the physical expansion of the communities continued, the problem of the NEP's limitations became increasingly obvious. The growth of Champaign was westward into the Mississippi River watershed, whereas the existing sewers all flowed easterly into the Ohio River watershed. The UCSD Board decided that the long-range solution was construction of the Southwest Treatment Plant (SWP) and the associated sewer system following the lay of the land in the southern and

The expanded SWP, completed in 2006.



The original SWP, constructed in 1968.

western edges of Champaign. The SWP was completed in 1968. The first Southwest facility consisted of grit removal, comminutation, aeration tanks, secondary clarifiers, aerobic digestion and sludge lagoons.

With the passage of the *Clean Water Act* in 1972, the more stringent EPA regulations that followed, and continued growth of the Champaign-Urbana area, both the NEP and the SWP were extensively upgraded and expanded between 1977 and 1982. These expansions included the need for nitrification at both facilities, which resulted in the nitrifying towers being built. In addition, excess flow facilities were added (instead of allowing high flows to bypass the treatment plant). At the SWP, chemical phosphorous removal was added due to the existence of a lake impoundment downstream of that plant.

2000 to present

A Long Range Facility Plan (LRFP) was adopted in 2002, which recommended the most recent series of improvements for both plants. These were to be implemented in four phases over a fifteen-year period. Construction of Phase I and II began in 2002 and was completed in 2005. Phase I consisted primarily of consolidation of all sludge handling and processing at the NEP. This project included Komline Sanderson gravity belt thickeners, Alfa Laval centrifuges, a new metal roof over the sludge storage pad, Vaughn digester mixing, and Caterpillar co-generation equipment. Other major improvements to this facility during this project included Sanitaire fine bubble membrane diffusers; Turblex high-efficiently, single-stage, aeration blowers; and a new SCADA system designed by SCADAware.

Phase II's 2005 Project modifications and improvements were completed at the SWP. These increased the Design Average Flow from 5.9 MGD to 7.98 MGD and converted the chemical P removal process into Illinois' first A/O Process biological P removal system. The expansion included new Waste-Tech influent fine screens, larger ITT Flygt raw wastewater pumps, a second excess flow clarifier, a seventh aeration tank, and a fifth secondary clarifier. In addition, the tertiary sand filters were replaced with Aqua-Aerobic cloth disk filters that could treat substantially more flow in the same footprint. To create the A/O Process, two existing aerated contact basins were converted to anaerobic basins for biological phosphorus removal. New Turblex high-efficiency blowers were also installed, along with new Komline Sanderson gravity belt thickeners. SCADA was also brought to the SWP, allowing regular staffing to be only 40 hours per week. Thickened waste activated sludge (TWAS) is stored in a new steel storage tank. A loading station facilitates hauling of the TWAS to NEP for processing.

The initial 2002 LRFP was updated in 2007 before proceeding with the Phase III and IV improvements. The revised plan concluded that both plants had adequate reserve capacity to meet the needs of the service area until at least 2019. Construction of Phase III and most of the Phase IV recommendations were completed in 2012. These improvements were all at NEP and included converting the disinfection system to a sodium hypochlorite and sodium bisulfite system, converting the existing tertiary sand filters to Aqua-Aerobic cloth disk filters, the construction of a new plant headworks building; an additional excess flow pumping station and clarifier; a new digested sludge transfer tank; and a new employee facility. Throughout the improvement over the years, the 1924 rock trickling filter still remains an important part of treatment.

We hope you found this history interesting, and are interested in hearing about how you and your predecessors have taken on the challenge of making a proper disposition of your community's wastes. CS

Click HERE to return to Table of Contents

Achieving Energy Neutrality Through Co-digestion

Water Environment & Reuse Foundation research provides both information and examples of successful energy recovery

By Kelsey Beveridge

Photo credit: Dreamstime.com

Many in the water sector are striving to make water resource recovery facilities (WRRFs) be energy self-sufficient. Achieving this goal will reduce both waste and costs. To help foster this, the Water Environment & Reuse Foundation (WE&RF; Alexandria, Va.) has conducted many research projects that examine ways utilities can recover energy and reach energy neutrality. Combining waste treatment with renewable energy recovery provides benefits that such conventional practices as fossil fuel utilization and landfilling cannot offer.

This collection of WE&RF research highlights programs at WRRFs that support energy recovered from wastewater as a renewable energy source. The projects highlighted below are intended for facilities practicing (or planning to practice) several different processes, including co-digestion; incineration; and energy recovery and food waste management through anaerobic digestion (co-digestion). The WRRFs and other agencies examined in these projects provide valuable information that others can learn from and incorporate into their own practice to reach their sustainability goals.

Click HERE to return to Table of Contents

Co-digestion of organic waste addressing operational side effects (ENER9C13)

WE&RF initiated a series of complementary studies to better expand the science and understanding of the best practices to advance co-digestion as an option for increased energy recovery. This first project is one in a collection of research intended to advance anaerobic digestion to enhance renewable energy. The ENER9C13 study evaluated five WRRFs in New York, Texas, and California for co-digestion design, performance data, and operation and maintenance issues.

The findings indicate that digestion of fats, oils, and grease (FOG), food waste, and other organic wastes can increase a WRRF's energy production. As the facilities studied were early adopters of this process, the findings highlighted challenges they faced and the steps they took to address them.

In addition, the WRRFs interviewed identified their best management practices for co-digestion systems. These practices may be beneficial to other facilities beginning their co-digestion programs. First, they recognized that consistent record keeping is crucial for operational decision making and identifying potential problems with accepting these wastes. Second, they recommended screening hauled wastes and creating a permit system for haulers who take measures to improve source control. Third, they recommended scheduling deliveries when WRRF staff members are present for unloading. Lastly, these facilities found that monitoring digester gas production requires better process control parameters than volatile solids destruction, which can be relied upon in anaerobic digestion of wastewater solids alone.

Energy recovery from thermal oxidation of wastewater solids: State-of-science Review (ENER13T14)

The research team on ENER13T14 performed a state-of-the-science review to evaluate the potential for energy and heat recovery from thermal oxidation of wastewater solids. They compared the value of the energy with that of coal in a triple bottom line approach and estimated the quantity of renewable energy available from thermal oxidation of wastewater solids.

> "Overall, the goal for these projects and others in WE&RF's portfolio is to help WRRFs and other agencies become energy neutral and reduce the demand for purchased electricity or natural gas."

The goal was to help WRRF managers identify how much energy could be recovered through implementing energy recovery projects and the potential for these projects helping facilities meet sustainability objectives. The research team developed seven scenarios to represent thermal oxidation (incinerator) system configurations. These scenarios identified potential energy recoverable from wastewater solids and residuals. Scenarios included co-firing wastewater solids with such alternative feedstocks as FOGs and woodchips to evaluate the potential for increased energy production.

The energy recovery in each of the seven scenarios produced more electricity than the solids process required to operate. This proves that energy recovery from thermal oxidation, theoretically, can make solids processing a net energy provider for WRRFs. The process is sustainable when compared to fossil fuel power generation; and existing and emerging thermal oxidation technologies provide reliable, effective, and flexible systems for implementing energy recovery.

Renewable energy production from DoD installation solids wastes by anaerobic digestion (ENER14R14)

Department of Defense (DoD) institutions, such as the Air Force Academy, produce large quantities of food waste and consume large quantities of energy. This study demonstrated demonstrates that the energy in food waste, if recovered, can supply 60% of the energy requirements for such DoD installations worldwide and help meet the DoD sustainability goals. Ultimately, the

> "Using anaerobic digestion to dispose of food waste while recovering energy also represents a significant greenhouse gas savings compared to landfills or composting."

project demonstrated that anaerobic digestion is successful as a means of treating food waste and producing renewable energy to partially offset an installation's energy demands while reducing waste disposal. Biogas generated by the digestion process can be used without further treatment to generate energy. To further maximize energy production, the biogas can be purified to biomethane as a natural gas substitute.

The results revealed that anaerobically digesting this food waste meets or exceeds performance objectives; moreover, the practice is cost-competitive with alternative methods of food waste management. Using anaerobic digestion to dispose of food waste while recovering energy also represents a significant greenhouse gas savings compared to landfills or composting. The produced biogas can be sent to a combined heat and power generator to produce electrical power that can be used to reduce facility power costs. The ultimate end use of the biogas or biomethane had a significant impact on cost-effectiveness.

Learning from WE&RF's research

Overall, the goal for these projects and others in WE&RF's portfolio is to help WRRFs and other agencies become energy neutral and reduce the demand for purchased electricity or natural gas. The information obtained and insights derived can help to show how different energy recovery methods can be incorporated. Even more so, however, exploring real-life applications can encourage decision-makers to use new technologies to help their operations long-term.

Kelsey Beveridge *is the technical writer in the Communications Department at the Water Environment & Reuse Foundation (Alexandria, Va.). She holds a Bachelor of Arts in Environmental Studies from Franklin & Marshall College (Lancaster, Pa.).*

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Save the Date

Government Affairs Seminar

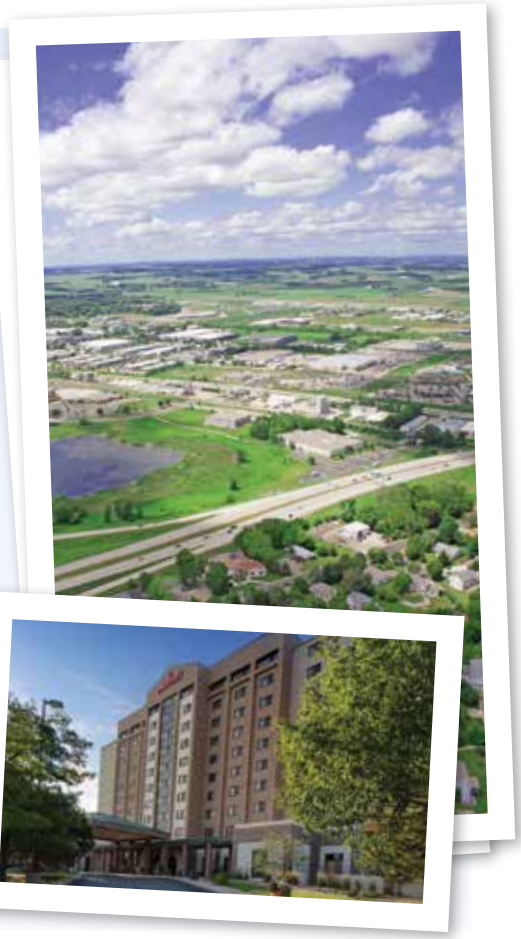
February 22, 2018 | Middleton, MI

CSWEA-WI section, WWOA, DNR, WI League Municipalities, and MEG are busy planning the next Government Affairs Seminar scheduled for **Thursday, February 22, 2018** at the Marriott in Middleton, WI. This seminar promises to be as good as ever covering topics such as:

- New news on the DNR and regulations
- Understanding your role in the regulatory political process
- Updates on watershed nutrient strategies for compliance
- Why the past is no longer good enough for variances such as chloride and mercury and why you should want to know
- Risk assessments of various phosphorus treatment technologies

This year's seminar will have something for everyone, large or small. Whenever possible, case studies will be used to help illustrate changing regulations. Experts will be available to field questions throughout the day.

New this year – in an effort to save cost, we will not be mailing a conference brochure. Conference information will be sent by email and will be posted at CSWEA and WWOA websites. Help us spread the news of the seminar to make this the best year ever. CS



Recommended Winter Reading

By Zach Matyja

Winter is a great time of year to find a comfy chair, cozy up by a fire, and settle in for a nice evening of reading…or so I've been told. With everything we get ourselves into during the holiday season, all our new New Year's resolutions fresh in our head, and ever lengthening to-do lists at the home and office, most of us don't take enough time to sit back, relax, and read. I know I get my (non-Dr. Seuss and *Goodnight Moon*) reading done on my commute and travels thanks to audiobooks.

If you are fortunate enough to be one of those who makes time for reading, OR, if perhaps "read more" is one of those New Year's resolutions, may I suggest some light reading? These documents have the potential to guide our industry in the coming years, or at the very least provide some good points for discussion around the dinner table or on the golf course at the 2018 Annual Conference (May 14-16, 2018, Drury Lane, Oakbrook Terrace, IL – register today!).

ASCE 2017 Infrastructure Report Card

http://tinyurl.com/CSWEA-ASCEreport

Our friends at ASCE do a great job of grading our nation's infrastructure every four years. It's exciting to report that the wastewater category has improved its grade from a D to a D+! This well-written report provides the eye-opening facts we, and our leaders, need to read to help us truly understand the valuable assets we work to maintain on a daily basis. The report estimates that $271 billion is needed in order for current and future demands to be met. Another number that hits close to home is the estimated 22 billion gallons of untreated wastewater that flowed into the Great Lakes basin through CSOs in 2014. We are making progress, but we still have a long way to go.

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force 2017 Report to Congress

http://tinyurl.com/CSWEA-EPAnutrients

This report is an update by the EPA to Congress on the Gulf Hypoxia Action Plan 2008. As we are all aware, nutrient reduction is the hot topic at most wastewater conferences these days, and for good reason. The report highlights that in Illinois, 47% of major municipal dischargers now have total phosphorus limits, an increase of 11% in the past two years. This number is certainly not going to go anywhere but up and nutrients will continue to remain a major issue for our organization. One of the recommended actions presented in this report is to continue to have the states cooperate to develop and implement nutrient reduction strategies. This is certainly one of the best parts about CSWEA – three states with different regulatory priorities. By having the knowledge of three states, our conferences will always have an expert who has been there before.

Climate Science Special Report

http://tinyurl.com/CSWEA-ClimateReport

It is nice to know that even in this time of uncertain federal support for environmental issues, significant federal reporting can still be accomplished. While we likely didn't need a special report to show us that our climate is changing, it is nice to have some scientific backup. Climate change is certainly going to have an impact on how we operate our collection and treatment systems. Since 1958, the Midwest has seen a 53% increase in the number of five-year rain events. No matter where you care to point the blame, we are going to need to find ways to respond to this change. Residents who are seeing sewage in their basement from a five-year event every other year, are not going to accept us not to!

If you made it through all those documents, congratulations to you! I suggest that you consider joining CSWEA in Washington, DC for Water Week 2018, April 15-21. The Illinois Section will again offer stipends to those interested in joining in this important week where professionals from throughout the country visit lawmakers to provide a unified voice for water. Watch for details on how to apply.

I'll leave you with one more recommendation, in case you made it to the very end hoping that you'd get an actual recommendation of a book you check out at the library and read. I recommend *Pompeii* by Robert Harris. It has everything a good book could ask for, murder, mystery, heroism, natural disasters, and more – with the added bonus that the main character is a hydraulic engineer! Happy reading! CS

> "It is nice to know that even in this time of uncertain federal support for environmental issues, significant federal reporting can still be accomplished."

The Great Lakes Past, Present and Future

By Jay Kemp

One nice thing about writing this message is that no one really tells you what to write about and so I'm going to write about what's on my mind – and what's on my mind are the Great Lakes. Half the population of Wisconsin lives in the 20% of its land area that is in the Great Lakes watershed. Lakes Michigan and Superior provide drinking water to 1.6 million people in Wisconsin and that water is largely returned as treated wastewater. But the reason that the Great Lakes are occupying my thoughts is an interview with Dan Egan that I attended as part of the Wisconsin Book Festival. Egan, a reporter for the *Milwaukee Journal-Sentinel*, has written *The Death and Life of the Great Lakes*, published earlier this year. While providing a history of the lakes and crediting the *Clean Water Act* with improvements in water quality, Egan's main thesis is that the lakes have been damaged and remain under threat from invasive species.

Egan postulates that the Great Lakes have a front door: the St. Lawrence Seaway and a back door: the Chicago Sanitary and Ship Canal. These portals have allowed in at latest count some 180 non-native species into the Great Lakes, including the sea lamprey, the alewife, zebra and quagga mussels. The motivation for the back door was a public health crisis caused by inadequate or non-existent sewage treatment. The solution to closing the back door may again be wastewater treatment to allow water to be returned to Lake Michigan that currently is diverted to the Mississippi River.

The front door was created for the economic benefit of opening up the Great Lakes to ocean-going ships. The problem has been that these ships for many years have discharged untreated ballast water carrying the unwanted species that are now established. The impact of the mussels has been especially significant in changing the biology and chemistry of the lakes through filter feeding which clarifies the water and actually reduces productivity. However, the mussels select for toxic algae so the lakes are still vulnerable to algae blooms when excess nutrients from runoff are present. This phenomenon led to the drinking water crisis in Toledo, OH a few years ago.

The Chicago canal system and the St. Lawrence Seaway were hailed as major civil engineering success stories. We are now realizing the implications and limitations of these projects. Overseas cargo now accounts for less than 5% of the shipping on the Great Lakes, carrying primarily steel in and grain out. The Seaway is closed at least three months a year. The big concern at the back door, of course, are various types of carp, Asian silver and big head carp, and the giant black carp not far behind. It seems that each of these projects has served its purpose and it is time to close both doors to restore the biological integrity of the Great Lakes. As cited by Egan, Aldo Leopold, a notable Wisconsinite, said: "A thing is right when it tends to promote the integrity, beauty and stability of the biotic community."

Undoing over 100 years of hydraulic engineering is a major undertaking. Perhaps the immediate focus can be to better control ballast water discharges and to ramp up efforts to stop the carp.

Egan further notes that our Great Lakes will continue to be sought as water source outside of the watershed. The demand for freshwater will be persistent and likely grow in intensity. The Great Lakes Compact requires unanimous approval of the eight states in the US for any diversion outside of the watershed. (Canada has a parallel law: states cannot enter into treaties with foreign governments.) The Compact must hold to resist the demand for water in growing southern and western states.

We are stewards of the water environment and I would encourage you to read *The Death and Life of the Great Lakes* as something of a wake-up call to what's happening to the biology of the Great Lakes that is not immediately apparent or well understood.

Congratulations to Dan Zitomer and Tom Sigmund on being inducted as a WEF Fellows. By the time you read this, the Education Seminar will be coming up and Wisconsin Section Government Affair seminar and winter board meeting just around the corner. As always there are many opportunities to get involved in Central States. Why not make 2018 your year to step up and join a committee or help plan an event? You will enjoy the connections you make and the teamwork involved in being part of the success of our organization. CS

"The Chicago canal system and the St. Lawrence Seaway were hailed as major civil engineering success stories. We are now realizing the implications and limitations of these projects."

Click HERE to return to Table of Contents

CSWEA WI Section – Operations Seminar

By Jeremy Cramer

The Wisconsin section held a resource recovery-themed operations seminar in Madison, Wisconsin on October 31. The seminar provided a good-sized group in attendance with several great talks followed up by bull session discussions. The seminar focused on energy-related topics in the wastewater field and provided a place for some great operations-related discussion.

The seminar started out with a talk by UW Madison professor Daniel Noguera who gave an excellent presentation covering cellulosic biofuels, cellulosic biorefineries, and the production of biochemicals (medium chain fatty acids) at wastewater facilities. Dr. Noguera's talk explained how the production of high value biochemicals can be an economically attractive alternative to biogas production. The next speaker, Megan Levy with the Wisconsin Office of Energy Innovation, discussed the newly implemented energy-related questions and requested energy data of Wisconsin wastewater facilities to be reported on the annual Compliance Maintenance Annual Report (CMAR) that is submitted to the Wisconsin Department of Natural Resources by each facility in the state. The energy data that was collected this year was presented and discussed and it was conveyed that there is still room for improvement in the reduction of energy costs at wastewater facilities in Wisconsin. Rusty Schroedel with AECOM then spoke on Energy Performance Contracting in the wastewater field. He discussed energy services companies and the successes and challenges with energy performance contracts. The audience then split up into groups and discussed the first three talks in a bull session format. This led to some great discussion and interaction amongst the groups with Troy Larson directing the bull session discussion.

Following a very fine lunch, Lindsey Busch of Corollo Engineers provided a talk on Milwaukee Metropolitan Sewerage District's piloting of new and simple biogas cleaning technology. This technology utilizes water scrubbing to remove H_2S and CO_2 and at the same time improve methane content in the biogas. Data from the Milwaukee pilot was provided and it showed excellent results at this level of testing. It was also discussed that a full-scale pilot will be installed in southern California in the near future. Up next to talk was Trevor Ghylin from Xylem Corporation who discussed a process optimization pilot project in Green Lake, Wisconsin that utilized online analyzers to not only achieve low levels of nitrogen and phosphorus being discharged in the effluent, but also excellent chemical and energy savings. The final talk of the day was given by Harry Mathos, the Director of Water Resources at the City of Beloit Water Resources Division. Harry gave a great talk on the past 25 years of changes, challenges, and successes at the Beloit wastewater facility. The day closed out with a bull session discussion of the afternoon talks. CS

Providing a Voice

By Timothy Wedin

In October, I received a phone call from Patti Craddock, whom many of you recognize from her many roles in both the Minnesota Section and in CSWEA. She had been monitoring the work that several state agencies had been doing on a Water Reuse Guidance document. A draft document had been released for public comment, and we agreed that, as a professional association, we should weigh in on the document.

We began by creating an Ad Hoc Committee, whose task was to review the document and determine what we thought they got right, and what we thought should be improved. Immediately, it was clear that the three weeks that we had would not be enough time to do a thorough review of the document. We each worked on the portion of the report that we felt the most familiar with, highlighting the strengths and weaknesses of the report. In the end, we submitted comments to the workgroup that we thought would help move the idea of water reuse forward.

Since our formation in 1927, wastewater treatment requirements have evolved. We have moved from focusing on BOD and TSS to discussions of Contaminants of Emerging Concern, including pharmaceuticals and personal care products. The state's guidance document also indicates a beginning of a discussion around water reuse, both for potable and non-potable uses. These discussions will need to include input from wastewater professionals who are not only familiar with the technologies needed to provide this level or treatment, but who are also aware of the costs of these technologies.

The Minnesota Section, along with CSWEA and WEF, will continue to provide input on these discussions. I am continually impressed with the degree of knowledge our organization possesses. Again, our review of the State's Water Reuse Guidance document relied on input from a variety of individuals, spanning several organizations and interests. As an organization, I hope that we can continue to provide our technical expertise to help shape the wastewater industry in the state.

As wastewater professionals, we need to continue to be a part of the conversation on topics that affect our industry. Opportunities such as the WEF Fly-In are a terrific way to keep us in front of our legislators as they draft laws that affect our industry. I hope that you will continue to find other ways to help CSWEA's voice be heard.

In closing, I'd like to give a big, "Thank you," to the people who stepped up to review the Water Reuse Guidance document.

- Alison Sumption, HR Green – Secretary/Treasurer
- Josh Gad, City of Mankato
- Mark Doneux, Capital Region Watershed District – Stormwater Committee Chair
- Tracy Hodel, City of St. Cloud – Resource Recovery & Energy Committee Chair
- Patrick Haney, HDR – Resource Recovery & Energy Committee Vice Chair
- Chris Harrington, HR Green – Government Affairs Committee Chair
- Doug Henrichsen, Brown & Caldwell – WEF Delegate, Patti Craddock, SEH CS

"As an organization, I hope that we can continue to provide our technical expertise to help shape the wastewater industry in the state."

32ND ANNUAL CONFERENCE ON THE ENVIRONMENT

On November 8, 2017 the Minnesota Section of CSWEA and the Midwest Section of the Air and Waste Management Association (A&WMA) hosted the 32nd Annual Conference on the Environment. Over 320 attendees, exhibitors, presenters and students attended to learn directly from technical, governmental, and business leaders in the fields of air, water and solid and hazardous wastes. Chris Harrington (CSWEA-MN) and Tony Colombari (A&WMA) co-led the event which was held at the Minneapolis Convention Center for the third consecutive year. Thank you to the large team of volunteers for making the event a success, you know who you are; Chris and Tony could not have done it without you.

Thank you to Leisa Thompson and Larry Rogacki of Metropolitan Council Environmental Services for putting together an outstanding keynote address that highlighted the success of the Clean Air Minnesota program and challenged us to create a similar partnership to address the problem of chlorides in our waters. A lively panel discussion followed the presentations and included Bill Droessler (Environmental Initiative), Beverly Farraher (City of Saint Paul), and Raj Rajan (Ecolab). I believe that the event and discussion piqued a lot of people's interest in coming together. Secondly, a big thank-you to the MPCA for creating and delivering so many outstanding presentations. And to the rest of the presenters please know that your quality presentations are what make the event worthwhile, thank you for your efforts.

Student Environmental Challenge Winners – North Dakota State University

As is tradition a few awards were given out at the event including the Student Environmental Challenge Awards and the Industrial Environmental Achievement Award. Pilgrim's (Gold'n Plump) received the Industrial Award for their efforts at their wastewater treatment facility. Additionally, the Student Environmental Challenge was held at the event and

2017 Conference Exhibitors

three teams participated. This year's contest required the students to plan an upgrade to a municipal wastewater treatment plant. The winning team was from North Dakota State University (pictured on previous page) and the second and third place teams were from the University of Minnesota Duluth. Congratulations to all of the participants for their effort putting together solid projects. Many other students were able to participate in the events of the day as research poster presenters as well as mentees at the student mentor breakfast.

Best wishes to next year's conference leaders Tim Wedin (CSWEA-MN) and Andrew Willing (A&WMA). Know that you have a large contingent to help you. And won't you dear reader please join the planning committee as well. Our organizations and our state need as many good ideas as we can get. Contact Tim Wedin at *timothy.wedin@metc.state.mn.us* to get involved. CS

Special thanks to our exhibitors and sponsors!

JANUARY

Executive Committee Meeting
January 18-19
Hilton Suites, Oakbrook Terrace, IL

Collections Workshop (with MWOA)
January 24
MCES Regional Maintenance Facility
Eagan, MN

FEBRUARY

35th Innovative Approaches to Wastewater Operational Problems
February 6
Holiday Inn, St. Cloud, MN

Government Affairs Seminar (w/IAWA)
February 27-28
Abraham Lincoln Hotel, Springfield, IL

WEF YP Summit 2018
February 19-20
Hyatt Regency, San Antonio Riverwalk, TX

Government Affairs Seminar
February 22
Marriott Hotel, Middleton, WI

APRIL

Student Design Competition
April 9
Monona Terrace, Madison, WI

23rd Annual Education Seminar
April 10
Monona Terrace, Madison, WI

MAY

CSWEA 91st Annual Meeting
May 14-16
Drury Lane, Oakbrook Terrace, IL

SEPTEMBER

WEFTEC 2018
September 29
New Orleans Morial Convention Center
New Orleans, LA

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CSWEA Welcomes Our New Members

Updated on December 19, 2017

September 2017

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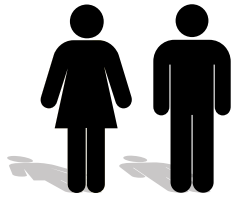

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