

CENTRAL STATES WATER

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

**INNOVATION
SPOTLIGHT:
MOVING FROM
WASTEWATER
TREATMENT TO
WATER RESOURCE
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PLANT PROFILE:

Fond du Lac WTRRF



PLUS:

95th AM Exhibit
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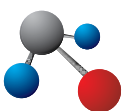
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Stronger Together

By Jane Carlson



Hello everyone, I'm Jane Carlson and I'm passionate about water! I'm honored to be your association president for the next administrative year, from May 2021 to May 2022. I'd like to thank our immediate past president Mark Eddington, who did an outstanding job leading our organization through what was one of our most challenging years. I'm sure he had plenty on his mind running a wastewater agency and raising kids during a pandemic and I sure appreciate his dedication. I'm glad we'll continue to have Mark's perspective and support on the executive committee for another year. Thank you to our other outgoing executive committee members including past president Doug Henrichson, PWO Representative Kathy Crowson, Wisconsin Trustee Jay Kemp, and Illinois Trustee Mike Holland.

I'm excited about the entire executive committee make-up and want to congratulate our new members or members in new roles, including Tracy Hodel as First Vice President and Amy Underwood as Second Vice President. They are long-time, active members of CSWEA and both are leaders of exemplary treatment facilities. I know their creativity and competence will continue to make the association strong and relevant. Congrats and welcome to our new PWO Representative Matt Streicher and new State Section Trustees Rachel Lee (WI) and Chris Marschinske (IL).

Many thanks to those who are actively serving in the state sections, as well. Our committees are as active and strong as ever, and that's a huge part of what makes us successful. I've been so impressed with the quality and variety of



association virtual seminars, meetings, and social events over the past 15 months. It's been great to see the state sections teaming up to deliver excellent seminars (maybe after some nudging from Executive Director Mohammed Haque, who always looks for improvements and efficiencies). When other industries hunkered down and did the minimum to ride out the pandemic, our members rolled up their sleeves and found work-arounds and safe, new, and effective ways to get the job done. And then they shared their lessons learned, both good and bad, with the rest of the industry. I'm both humbled and proud to be a member of such an outstanding association. You people rock!

I'd like to take a few paragraphs to tell you about three priorities for the next administrative year. First, you can expect to see a transition back to in-person events this fall (woo hoo!). Some events may continue to be virtual or hybrid, and we're getting very good at those.

But I know we're all looking forward to networking and socializing in person, perhaps starting with the WEFTEC welcome reception in Chicago! Please watch your emails and check the Central States website for upcoming happenings.

Another priority for the coming year is to make sure our association remains fiscally strong. We weathered some losses during the pandemic. We managed to get by without the need for grants or state section help because we had adequate reserves. Our annual meeting is our big revenue generator, and not having it in-person meant much lower revenue for two years. We have not raised our association dues in many years and are now at the point where we need to consider this. A modest increase in dues may be needed so we can continue to accomplish our goals and get our reserves back to an appropriate level. The executive committee will review this and make a recommendation with a possible member vote at our next annual meeting.

My other main priority and one that WEF is working on is diversity, equity, and inclusion (DE&I). I remember my first CSWEA events some 30 years ago. Being one of the few women in the room was intimidating, even though I had some wonderful mentors in CSWEA. (I just have to name some of them here: Dan Lynch, the late and great Jim Shaw, Michael Doran, Ron Dickrell, Carol Strackbein, Bart Jones, Eric Lecuyer, Joan Hawley, and many more!) Our association has made great strides in gender diversity and in promoting and supporting women in leadership roles. However, we could do

much better with respect to racial diversity. It's important that we truly represent and understand the communities we serve. Diversity makes organizations more creative and resilient. WEF is developing a DE&I toolbox for member associations, but in the meantime let's keep building on the great foundation we already have and continue to work on this issue. For example, we have been incorporating more DE&I subjects into our seminars to raise awareness. We have initiatives such as the Stockholm Junior Water Prize and the Student Essay Contest that can be used to reach out to underrepresented minority students. Global

Water Stewardship is a great example of a program that increases our diversity and works on social equity issues. Through these activities and while working and advocating for water we can reach out to students, young professionals, and colleagues of color and encourage them to get involved in our association. And then we need to welcome and support them when they do, just as we should for all new members. The DE&I initiative will be a multi-year effort but let's not let it be another 30 years or even five years before we see a more colorful association and executive committee. If any of you have specific ideas on what else the association can do to promote DE&I, or you're not sure but you just want to help, please contact me.

Our 94th Annual Meeting last month was a huge success, thanks to the Local Arrangements Committee led by Amy Underwood and the Technical Committee led by Mandy Sheposh. I am pretty sure it was the best virtual meeting I've ever attended, but then I'm biased. The technical program was very strong, we completed plenty of association and state section business, and we presented two years' worth of awards. I appreciated that it was spread out over four days so we had a chance to catch up on some work and stretch our legs in between sessions. The GWS 50/50 raffle draw was held on the last day and raised \$775 total; half of that will go to GWS and the other half to our raffle winner, Eric Lynne of Donohue. Thank you again to our WEF visitor, past president Jackie Jarrell - it was wonderful to have her participation and perspectives. Kudos and thanks again to the various committees, speakers, and moderators who worked so hard to make the event a success, and congratulations to all our award winners! Adapt and Thrive, indeed!

Thanks also and always to our Executive Management team of Haque and Associates - Mohammed and Amy - plus Jonah Arter - for keeping things running smoothly and for all that they do to make this one of the best Member Associations.

Thanks to all of YOU for all you do for clean water and resource recovery every day. We have so many unsung heroes in our midst. We are stronger together! Keep up the great work and I look forward to seeing you in-person soon! [CS](#)

"Thanks to all of YOU for all you do for clean water and resource recovery every day. We have so many unsung heroes in our midst. We are stronger together! Keep up the great work and I look forward to seeing you in-person soon!"



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By WEF Delegates, David Arnott and Tracy Ekola



David Arnott

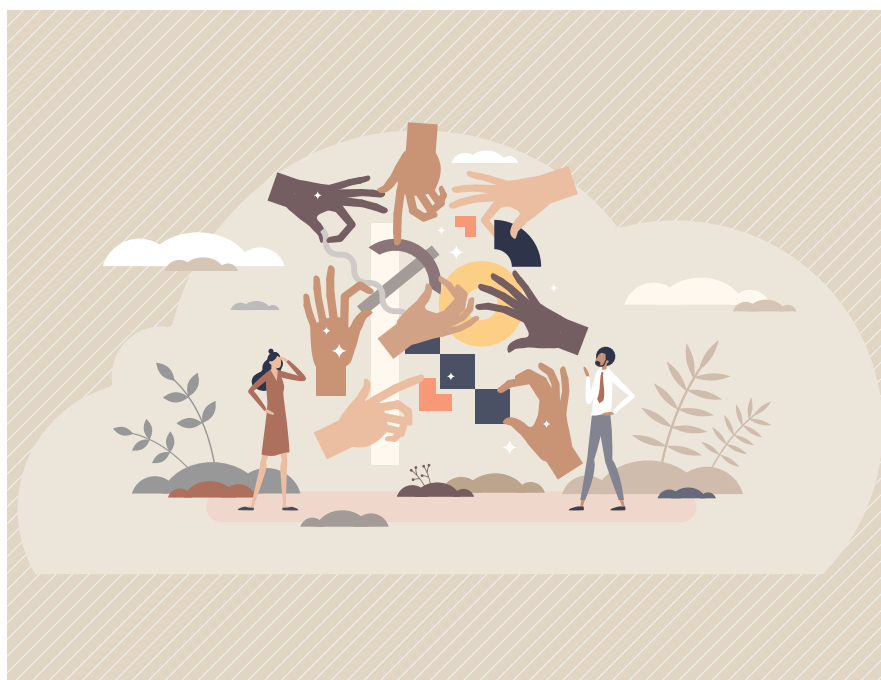


Tracy Ekola

We hope this update finds you well and that you are enjoying the beautiful summer, great outdoors, and clean water the Midwest offers.

WEFTEC will take place in Chicago October 16-20, 2021 at the McCormick Place convention center, with the Exhibition taking place October 18-20, 2021. We are excited about seeing many familiar faces in person for those that are comfortable attending, though some parts of the technical program will be available virtually. Planning for welcome reception is underway and the House of Delegates meeting at WEFTEC will take place on October 16. For delegates that cannot attend in-person, a virtual House of Delegates meeting will take place two weeks beforehand to handle business matters for the complete group such as voting.

In response to the pandemic, several new health and safety measures will be implemented at WEFTEC. These measures will include but not be limited to daily digital health screenings to participants' mobile devices, a mask requirement while indoors and on shuttle buses, extra resources for hand hygiene, limiting capacities on shuttle busses and in meeting and session rooms according to physical distancing guidance, and more frequent cleaning and disinfecting of high traffic areas and high contact surfaces. It is important to note that WEFTEC will not be the first large convention held at McCormick Place since the start of the pandemic. The Chicago Auto Show was held there in July of 2021. To learn more about the current health and safety protocols at WEFTEC visit www.weftec.org/attend/health-and-wellbeing.



Work continues in the WEF workgroups. Interviews have been sent out for the Conference Resources work groups to see how other MAs have handled their Annual Conference in a virtual environment. Look for an Infographic to be published soon from this workgroup. This information will be valuable as MAs implement a combination of in-person and virtual events in the future.

Financial Diversification is another active workgroup at WEF. It is recognized that many MAs get most of their revenue from their Annual Meetings, which have been cancelled or scaled back the last couple years. Now more than ever, it is important to have financial diversification for revenue streams. Within CSWEA,

we have done a great job at this by pivoting more towards webinars and on-line operator training courses. These programs have helped minimize the financial challenges of our Association and the State Sections. A survey was sent out to MAs to gather information on how they diversify their revenue streams. Results are being compiled now and should be published soon. The purpose of the surveys is to compile the information and allow MAs to learn from others. It is hoped the results should also spur ideas and energize MAs to develop new initiatives.

Diversity, Equity, and Inclusion (DE&I) is an important initiative this year at WEF. The official WEF statement on DE&I is as follows:

The Water Environment Federation (WEF) maintains diversity, equity, and inclusion (DE&I) as core principles of our organization's mission. Our members, Board of Trustees (BOT), volunteer leaders, and staff together and individually share responsibility to uphold these principles.

We are committed to creating an organization that acknowledges and celebrates our unique differences including education, career background, age, gender, race, ethnicity, nationality, gender identity and expression, sexual orientation, ability status, accent, socioeconomic status, cultural heritage and religion, parental status, marital status, veteran, personality type, political perspective, and all other characteristics of DE&I.

The needs of the clean water environment are great. We need to reach out to all people to attract talent to our profession to solve daunting problems. Considering problems and issues in the clean water environment from multiple aspects and viewpoints will allow for more robust, long term, and widely accepted solutions. In addition, we need to make sure we are providing opportunity to train, develop, and advance people from all backgrounds in our profession. A DE&I survey was sent out to MAs several months ago. The results are being compiled and will be published soon. In addition, a DE&I toolkit is being developed to help MAs start a committee or program. To learn more about the WEF DE&I program, visit www.wef.org/about/diversity-equity-and-inclusion. There are likely some improvements CSWEA can make about having a more active DE&I program.

In addition to workgroups, WEF has initiated the following efforts to address emerging and changing needs within our organization and industry: Member Engagement Transformation, PFAS Task Force and Integrated Planning Task Force. Members from each of WEF's committees are included in the PFAS and Integrated Planning Task Force. These three initiatives were started in February and March 2021 and will be ongoing

through 2021. Updates will be provided as available and look for information on these topics as part of WEFTEC.

An important but overlooked tool that WEF offers is WEF.COM, an online community hosted by WEF. WEF.COM serves as a virtual workspace empowering WEF members to network and collaborate in an online environment. After creating a personal profile, you can share ideas, resources, and events to the whole WEF community or specific committees or working groups. You can also start a discussion group or blog. Lastly, WEF.COM allows you to organize, tag, and share documents in committee-specific libraries. We encourage you to explore WEF.COM and see if it is right for you.

Another important tool that WEF offers is the Water Advocates Program. The following link is the page on main WEF website: www.wef.org/advocacy/water-advocates.




This program empowers individuals to share your knowledge and expertise to inform government decision makers

about the importance of water. Aging infrastructure, strict requirements, and continued economic pressures have put unprecedented stress on local governments and agencies that provide essential water services. Elected officials are being called upon to make tough choices that will impact water quality and the viability of our communities for generations to come. The Water Advocates Program helps you to reach out to and connect with elected officials on important water quality issues. Standard form letters and other tools are part of the program. The Water Advocates program streamlines your individual advocacy effort on the importance of the water environment. We encourage you to investigate this program!

As WEF Delegates, we are here to support you and represent the interests of the Member Associations to the House of Delegates and WEF. If something is on your mind, please feel free to call or email. We are here to serve you/CSWEA and be a liaison to WEF leadership. We look forward to hearing from you! [CS](#)


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Welcome, Please Join Us

By Mary-Frances Klimek

Like many of you, I like a good party. The social event is one of my favorite events of the annual conference and something that I missed having in person this past year. What does it take to make a good party? Let me help you out: "You are cordially invited to get involved. Please come to any CSWEA Wisconsin Section event that piques your interest, even if you feel a bit like that event is not necessarily aimed at you." All events are truly meant for each and every one of you and if it helps, think of these events as 'parties'. And when you sign-up, feel free to bring someone with you – the more the merrier.



CSWEA belongs to each and every one of us and I hope that you will take that to heart and find the committee, conference or workshop that interests you. Start by coming as an attendee and then perhaps transition to a participant and maybe even a committee member. Whatever level of involvement that works for you is appropriate, but remember to be open to getting out of your comfort zone once in a while. These are all opportunities for all of us to learn, share experiences, and network. I can't count the number of times that I have had a wastewater process or staffing question to which I didn't know the answer. It is the best feeling to know exactly who to call and this is because of the opportunities Central States provides to us to network with one another.

This organization has so much to give to you. Also, realize that this organization offers you opportunities to give back. By giving back to the organization, not only will you grow as an individual (remember that comfort zone that I challenged you to get out of?) but you will help Central States and those that take their involvement seriously to expand, learn new things, and make a positive change through environmental efforts that we all prioritize. This is your shot at making an impact. Grab on and enjoy, meet new people and find new opportunities because it feels good to be reinvigorated and excited about what you are doing. By sharing your expertise, you strengthen the organization and make it better for those to come.

Coming up soon, join the Wisconsin Section for the Industrial Pretreatment Seminar. This will be a virtual event taking place the mornings of August 24 and August 25. Also, on August 24, join us in the afternoon – in-person or virtually – for the Wisconsin Section Meeting followed by the much looked forward to YP Brewer Outing. I know this makes August 24 a busy day, but aren't we all due a bit of fun? On September 9, we welcome you to the Northwoods Collection System Seminar and on September 23 to the Classic Collection System Seminar.

This promises to be an amazing year. We are fortunate

to have a state section that is welcoming and adaptable. Thank you to the 2020-2021 Chair, Veronica Loete, and Past Chair, Rachel Lee, who along with Jake Becken and Troy Larson put together a fantastic Operations Roundtable last year. The focus had been on the industry's dealings with COVID-19. The outcome was so well received that we are looking at putting together similar groups focused on various topics. Topic suggestions for next roundtables include Staff Retention and Dealing with Transfer and Loss of Institutional Knowledge,

Instrumentation and Automation, and Security and Emergency Preparedness. Let me know if you have additional suggestions.

Thank you for the opportunity to serve as the Wisconsin Section Chair. I look forward to helping more of you become not only involved, but also engaged in all that Central States puts forth for its members. [CS](#)

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Wisconsin Section YPs Are Off to a Running Start



By Mary-Frances Klimek and Paige Peters

The Wisconsin Section Young Professionals and Student Committee, chaired by Paige Peters and Erin Wells, is off to a great start. This dynamic duo has made it their mission to get section YPs and students involved, engaged and ready to make a difference.

The committee's theme for this year is 'engagement'. The last year has been challenging and everyone is excited to gather together. The group hopes to provide an outlet for productive and social gatherings that enhance the water and wastewater industry community in Wisconsin. The group welcomes all that are interested in being involved.


CSWEA WI Section YP and Student Committee, recognizes YPs as individuals not by their age, but by their stage in their professional development. Paige states: "We welcome YPs who are eager, passionate, and seeking opportunities beyond their day jobs to engage with peers and the water and wastewater industry, and to contribute to the education, and networking of the greater community."

The group plans to host various events targeted at aspects of career development that may challenge younger professionals and students more than senior professionals (including technical knowledge, work-life balance, mental health, and building a family alongside a career); however, they will keep their monthly happy hours, hosted by YPs, open to all professionals interested in connecting with friends and colleagues, making new connections, or just enjoying the view across the harbor of MMSD's Jones Island Water Reclamation Facility. The monthly happy hours will be the third Wednesday of each month at 5:30 pm at Boone & Crockett in Milwaukee, WI. CLEARAS and Mulcahy Shaw Water sponsored May and June's events, respectively, with Xylem committed to sponsoring the next one on July 21, 2021 at 5:30 pm. The group is looking for future sponsors! Please contact Paige Peters at paige.peters@mu.edu if you are interested in sponsoring a fun night of networking.

The group will be sponsoring the Annual Brewer Outing complete with a pregame tailgate on Tuesday, August 24. The tailgate will follow the Wisconsin Section Quarterly Meeting which will be at the Global Water Center, 247 Freshwater Way, Milwaukee, WI 53204. Thank you to Xylem for providing the meeting space. Everyone is welcome at the meeting and we are



hopeful that YPs, students and other professionals will attend the meeting and then head over to tailgate. Come with ideas to help make the Wisconsin Section all that it can be. The committees are interested in having your involvement and participation in meeting your needs.

The YP issue-focused events will likely be virtual, and the WI Section YP/Student Committee is seeking individuals to assist in planning and possibly facilitating those events. These events will be targeted to YPs with the goal of creating a space for open conversation and the ability to share individual experiences to bring greater understanding to some difficult topics. If you are interested in joining the WI Section YP/student Committee, please contact Paige Peters (paige.peters@mu.edu) or Erin Wells (wellsee@bv.com). 

"We welcome YPs who are eager, passionate, and seeking opportunities beyond their day jobs to engage with peers and the water and wastewater industry, and to contribute to the education, and networking of the greater community."



Perspective

By Emma Larson

The summer magazine means the Annual Conference is over and changing of the guard is complete, so it is with great honor that I write to you as Minnesota Section Chair. With an organized, enthusiastic, determined, and strong leader to follow, it will make this transition much easier. I cannot thank Ms. Anna Munson enough for the encouragement and leadership throughout this past year. She has given Ms. Jackie Strait and me something to live up to.



The Annual Conference went virtual for the second year in a row; planning and preparation for the virtual conference was significantly more straightforward than the scramble of 2020. My experience as Technical Committee Chair for the 2020 Annual Conference was hectic, but with Mr. Mohammed Haque, Mr. Jonah Arter, the Executive Leadership Team, and Local Arrangements Committee; both 2020 and 2021 were a great success and clearly demonstrated the ability of our organization to Adapt and Thrive through all that life throws at us. A tremendous bonus of the new virtual conference world is being able to attend conferences that we would previously been unable to attend.

With all that the last year (and change) has been for so many – a pandemic that saw many of us transition very quickly to working from home, juggling schooling of children while maintaining workforces that are at the frontline of public health protection; the continued emergence of PFAS as a contaminant of concern with effluent and biosolids limits threatening; civil unrest putting much of our infrastructure in harm's way; staff shortages; all while dealing with material shortages and skyrocketing construction costs. We cannot claim the last year to be a quiet one. However, we can be thankful that the killer bees never materialized!

There are many lessons to learn from this year. My favorite of these is Perspective. Perspective allows us to see things in their relative importance. 2021, with looming drought across the mid-west bringing watering bans and low flows, continued unrest in many cities, and low staffing numbers allows us to use the lessons of 2020 to march ahead, knowing that our Utilities, Cities and Counties will survive. Perspective allows us to see the good in the chaos, and to know, this is only a season.

There are also the things that have seemed like divine planning such as the USEPA American Water Infrastructure Act of 2018 requiring the development of Risk and Resiliency Assessments and Emergency Response Plans in 2020 and 2021, both covering pandemics and droughts.

Central States has always been about professional growth and development, moving Wastewater technology and innovation forward, but 2020/21 has shown us that the people we work

with have human sides too, especially when online meetings get additional visitors in the form of children and puppies. The people you have met at conferences, professional networking sessions, classes, and workshops – every one of them has had their own struggle this past year. What a wonderful way to relish in our humanity and work towards continuing those personal connections as we transition back to in person meetings.

The opportunities continue this summer: the NEW Future of Wastewater Virtual Tour is on July

15, the Fundamentals of Collection Systems is on July 21, and the Wisconsin Section Industrial Pretreatment Seminar will take place on August 24 and 25 – all virtual so you can attend from anywhere! Watch www.cswea.org for more opportunities.

With that, I bring my first of four Minnesota Chair messages to a close. I am privileged and humbled to represent a group of hardworking, dedicated, and talented water professional humans. CS




“We cannot claim the last year to be a quiet one. However, we can be thankful that the killer bees never materialized!”

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Sometimes Things Don't Work Out Quite the Way You Imagine



By Bob Swirsky

That's pretty much the way I would describe the last year and a half. The changes and difficulties of the pandemic caused almost everyone to drastically change the way they worked and socialized. I was interested to see how a membership association that incorporates components of both features of work and socialization would fare through the altered bounds necessitated by the restrictions that were imposed due to the pandemic.

I think that CSWEA thrived thanks to the efforts of Mohammed and Amy, the section and committee chairs, and all the members that supported them. I thought that the first virtual annual meeting last year went well and the virtual meeting in May of this year was even better. To me it showed that a membership association with members that are committed to sustaining it for the benefit of all can succeed even in the face of an unexpected emergency.

Amanda Streicher did an excellent job as the Illinois section chair adapting to the conditions over the past year, thanks to Amanda's enthusiasm and leadership the first IL-X was held virtually last October. I am grateful to have been asked to chair the Illinois section of CSWEA, along with two very talented and active members, Jason Neighbors as Vice Chair and Jillian Kiss as Second Vice Chair. I hope we can continue the momentum that Amanda maintained this past year.

At the Illinois section meeting that was held in May there was discussion about some possible in-person events as well as continuing with planning some virtual events. The Education Committee is working on a Waterpalooza event and working on putting together a few plant videos and virtual tours. The Industrial Pre-Treatment Committee is planning a laboratory-focused webinar for fall of 2022. The Collection System Committee is looking into the possibility of holding an in-person event downstate in October of this year and possibly returning to the regular in-person seminar in Naperville in June 2022. The Operations /Safety Committee has reached out to the WI section to see if there is interest in a joint event. WI is waiting to see if their next event will be in-person and will determine if they will combine efforts. The Government Affairs Committee is looking to host the next seminar in conjunction with IAWA Mini Conference, the tentative/likely date is March 1, 2022. The Biosolids/Energy/Resource Recovery Committee reports that they are working on pulling together a few webinars on various topics and that a webinar should be coming out this summer on the Fox River Water Reclamation District sequestration project.



Please contact me with any suggestions or ideas that you may have that you think will help us improve and grow. It is encouraging that everyone remains energized and excited to innovate, participate and continue to sustain this exceptional association. I look forward to working with everyone and I appreciate the encouragement and support that many of you have already offered.

Thank you,
Bob CS

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Fond du Lac WTRRF Recieves 2020 Wisconsin Operation Award

By Cody Schoepke



The Fond du Lac Regional Wastewater Treatment and Resource Recovery Facility is located at the base of Wisconsin's largest inland lake, Lake Winnebago. Wastewater flows in from the City of Fond du Lac as well as 18 other towns and villages surrounding it. Serving approximately 60,000 residents, average daily flows are just shy of 8 MGD but can include significant contributions of I/I during heavy rain events, increasing the flow to 60 MGD. Typical influent concentrations in mg/l are 275, 250, 6 and 22 for BOD, TSS, TP, and NH3 respectively. The plant

is a one shift operation consisting of 21 employees: seven operators in an on-call rotation, five maintenance staff (including an electrician), three lab techs, one industrial pretreatment sampling technician, and five admin.

The nearly 200 miles of sanitary sewer within the city is maintained with assistance from other divisions. The televising crew performs the mainline and lateral investigation to prioritize repairs and replacements. Fond du Lac WTRRF utilizes two sewer vacs to keep up on scheduled maintenance of the system. Staff is involved in clearwater home inspections to investigate the various

issues that could be occurring within the foundation. The City has invested money in collection system improvements for many years, but has taken a more aggressive approach within the last two years. The new approach considers how to address the large volume of I/I coming from the private side the City has needed to bypass out in the collection system. The treatment plant has had to blend partially treated with fully treated water. With lower effluent limits focusing on mass, the goal is that with the change in mindset of addressing I/I over time, it will minimize or eliminate those situations and aid us in meeting those limits.

The Industrial Pretreatment Program consists of 10 significant industrial users with three of those being monitored 24/7. Industries range from dairy and cardboard/packaging plants to metal coating and manufacturing. The pretreatment program is a critical facet to the overall operation. It has been integral in addressing mercury and phosphorus and will likely be in addressing PFAS as well. Industrial loading to the treatment plant can exceed 50% at times and having that much industry in town can wreak havoc on the secondary treatment system in a short amount of time. Communication with the industries is one of the most important parts of the program.

The treatment facility begins with six submersible influent pumps ranging in capacities of 7 to 13 MGD. The wastewater is pumped to the second story of the influent building where it is gravity fed the rest of the way. Preliminary treatment consists of perforated plate fine screens and grit removal with a vortex-type grit washing system. Two co-thickening primaries are utilized for primary clarification.

As part of a large plant upgrade in 2008, the secondary treatment facility was constructed as a conventional activated sludge system, supporting nitrification, and denitrification. The setup included an anoxic zone followed by an aerobic zone. With a 1 mg/l limit the facility was setup with chemical phosphorus removal. Both ammonia and phosphorus limits were easily met with that design. Since that time Fond du Lac WTRRF has received a new phosphorus limit of 0.19mg/l or 17.366lb as a six-month average. Over the course of the last six years the staff has moved towards biological phosphorus removal as part of our compliance plan. The challenge has been consistency. It is very difficult to perform bio-p at a consistent rate when dealing with a secondary treatment system that wasn't designed with it in mind, with fluctuating influent loads to the facility because of local industry, a heavily loaded sidestream from dewatering, and excessive I/I from the collection system. Several modifications have been made to the aeration basins to promote bio-p activity. Those include: removing a portion





of the diffuser system in the first pass and relocating the mechanical mixers to extend the anoxic zone, adjusting mixer times to create a fermentation scenario to increase the quantity of vfa available, and increasing the baffle wall height to prevent oxygen from flowing back into the newly created anaerobic zone. With this baffle wall addition at normal liquid level height the flow now cascades into the aerobic zone. The design of the baffle wall included four openings at the bottom. It was found that flow was actually pushing through those openings and aiding in that back mixing. As a result, the maintenance staff made gates for all the openings so they'd be blocked off. Lastly, an additional carbon source has been added to our RAS to provide supplemental COD for times when influent loading is decreased.

The ammonia-based aeration control system installed in 2019 has been an integral part in our bio-p success as well. Not only are we controlling air based on ammonia, the control package and diffuser grid layout simultaneous nitrification-denitrification (SND) takes place as the mixed liquor flows through the basin eliminating the need for the separate denitrification zone. Because of this, the staff was able to remove the nitrate recycle pumps that typically pumped aerated mixed liquor back into the anoxic zone and actually blocked off those holes in the wall creating a truly anaerobic zone. As the SND took place, we are able to simultaneously remove ammonia-nitrogen and phosphorus when in the past, with the original design, it was near impossible to both nitrify and remove phosphorus biologically. With

staff implemented modifications and the control system, it is able to perform bio-p approximately 80% of the time. Using future control strategies, our goal is to increase that consistency even further.

The last portion of secondary treatment consists of four final clarifiers using the "organ pipe" RAS removal system and is pumped to the head of the aeration basins. Wasting is accomplished by pumping to the primary clarifiers and to digestion.

Fond du Lac WTRRF uses ultraviolet light for its seasonal disinfection requirement before treated effluent is discharged to the lake.

Fond du Lac WTRRF is a high strength waste receiving facility that has approximately 30,000 gallons/day hauled in. That high strength consists of dairy and food wastes from local industry.

The primary/WAS sludge from the clarifiers is pumped to the first of four anaerobic digesters, which then overflows to the second and joins the high strength waste addition. The digesters function in series, therefore the sludge from the second digester is pumped to the third which overflows into the fourth. Most of the digestion takes place in the primary digesters. The typical VSR is in the 60% to 70% range. Approximately 200,000 cubic feet of biogas is produced each day. There is 40,000 cubic feet of storage in the floating covers of the third and fourth digesters.

The biogas produced flows through a biological H₂S system, a siloxane removal system, and several moisture traps before being utilized as a fuel source. The most important use is fuel for the 450 kW CAT CHP unit. With this unit running at near full capacity around the clock we are able to produce approximately 45% of the power needed to operate the treatment facility. The waste heat is tied into the hot water loop for process and building heat. The second use is for boiler fuel, which is critical to maintaining process temperatures in the digesters and in heated effluent water for the deammonification system. The remaining gas that can't be used or stored is flared.

The remaining sludge in the digester is pumped to the centrifuges for dewatering. Utilizing a dry polymer a typical end product of 25% Class B cake solid is achieved. Annual production is approximately 10,000 wet tons with 70% of those going to land. The facility does not have any storage and therefore must landfill the remaining material. Further solids handling operations are being evaluated for future implementation.

The typical sidestream ammonia load to the mainstream was approximately 40%, even though it was only 2% of the flow. Knowing the importance of the high strength waste receiving facility to local industry and the community, the possibility of needing to construct a fourth aeration basin at nearly double the cost of a sidestream treatment system, and moving forward with bio-p for addressing our phosphorus issues, the decision was made to implement side stream treatment. Deammonification is the process that utilizes Anammox bacteria to perform high



rate nitrification-denitrification in a small footprint. Three systems were evaluated and the AnammoPAQ system was selected. The Fond du Lac WTRRF was the first Paques System in the US and first deammonification system in Wisconsin.

The centrate flows from the centrifuges to the centrate eq tanks and from there it is pumped up to the tilted plate settler (TPS) where solids are settled out. Solids are one of the inhibitory items for the bacteria therefore it was recommended to install a TPS ahead of the reactor because of the lower capture rate of the centrifuges. The settled solids are pumped back to the digester. The TPS overflows into the reactor with almost no TSS at all. Heated dilution water is added to maintain temperature and ensure any floc material that has developed in the reactor is able to be flushed out. A very low quantity of micronutrients and anti-foam are added continuously. Inside the reactor resides the internal settler, which is where the treated effluent flows out. The lamella plates in this settler help keep the Anammox granules where they belong – in the reactor. Fond du Lac WTRRF started this system up in January 2019, one of the coldest winters on record after several delays in equipment and seed arrival. Amazingly, within three weeks they saw 85% removal of ammonia at near full load to the reactor. Even today they consistently achieve greater than 85% removal on full load.

My predecessors, Jeremy Cramer and Autumn Fisher, put in the work to change the mindset that we are no longer only treating wastewater. I learned so much from them in the short amount of time we were together. I wouldn't be where I am today without their influence, decisions, and knowledge.

I couldn't be more proud when looking at everything the staff has accomplished as part of the daunting task of being a resource recovery facility. From the think on the fly fabricators of our maintenance division, who are always looking to tackle issues in-house, to the operators, who always seem to find a way to get things done our plant exemplifies creativity and efficiency. When a piece of equipment arrives or a new process is started, that's never good enough. Keeping that mindset pushes our facility to new levels.

The lab technicians who work in

our onsite state certified lab, are the glue that ties everyone's work together. They are constantly receiving process samples, running profiles and calibration verifications, you name it, on top of reporting requirements, industry, and hauled in waste analysis. They find a way to make it work and we are better because of it. Our industrial pretreatment program is our seatbelt and keeps the plant safe and operating smoothly. At times it may seem

out of sight and out of mind, but is critical to our success. And lastly, the administrative folks somehow manage to keep this joint organized and on track. A lot is asked of the staff here and if the direction isn't uniform then we don't succeed.

My name may be on the award, but it is (without a doubt) a group effort and each and every member here gives us the opportunity to be successful. It is truly an honor to work with these individuals. [CS](#)

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Innovation Spotlight:

Moving from Wastewater Treatment to Water Resource Recovery with Supercritical Water Oxidation (SCWO)

By Marc Deshusses, CTO, 374Water Inc. and Duke University Professor and Researcher;
Doug Hatler, Environmental Engineer, 374Water Inc. and President of Environmental Business Ventures; and
Kobe Nagar, CEO, 374Water Inc. and Duke University Researcher.

Most small to medium wastewater facilities in the United States (<50 MGD) are operating as end-of-pipe treatment plants with little or no recovery of resources. They are using ~ 3% of our electrical load, or about ~2300 kW-h per million gallons of sewage treated. The majority use an activated sludge process to degrade organics, nitrify ammonia to nitrite and nitrate. At some plants, denitrification is performed converting nitrite and nitrate to N_2 . In rare cases, phosphorus, a finite resource, is managed and recovered through enhanced biological phosphorus removal.

374Water, of Durham, NC, is commercializing a novel approach

to Supercritical Water Oxidation ("AirSCWO"). It has the potential to shift the wastewater paradigm from end of pipe treatment to resource recovery. It harnesses energy embedded in the waste stream undergoing treatment, while enabling recovery of clean water and minerals, paving the way for efficient resources recovery from all kinds of sludges and biosolids. The process is fast, clean, and a net energy producer. Moreover, the benefits of SCWO empower organizations to achieve the United Nations Sustainable Development Goals (SDGs).

SCWO for Resource Recovery

Supercritical water oxidation is an advanced oxidation method that relies on the unique reactivity and transport

properties of water when the wet wastes are brought above the critical point of water (374 °C and 218 atm, or 705 °F and 3200 psi). According to Tassaing, Danten, and Besnard in the November 2002 Journal of Molecular Liquids, supercritical water is a dense single phase with transport properties similar to those of a gas, and solvent properties comparable to those of a non-polar solvent. When oxygen is present, it is fully soluble in supercritical water, resulting in extremely rapid and complete oxidation of all organics to carbon dioxide, nitrogen gas, clean water, and mineral salts. The heat from the oxidation reaction is recovered and used in part to heat the influent stream while the excess heat is converted to electricity (Figure 1).



Figure 1. Supercritical Water Oxidation (SCWO) Reaction Equation

Depending on the concentration of the feedstock, reactors can be operated auto-thermally (i.e., no outside input of heat is required). Typical reaction times are in the order of 2-10 seconds allowing much smaller systems for the same throughput, making it possible to build systems that are compact compared to other technologies. The process does not generate harmful by-products such as NO_x, SO_x, VOC, or odors per Bermejo and Cocero in their article, "Supercritical Water Oxidation: A Technical Review," published on September 6, 2006 in the Journal of American Institute of Chemical Engineers. Ammonia and organic nitrogen in the waste undergoing treatment are converted to nitrogen gas, while phosphorus precipitates as phosphates and can be recovered. The amount of CO₂ generated is less than what is currently generated by the current approach to handling sludges and biosolids.

The Benefits of AirSCWO

The value of AirSCWO to destroy organics and recover resources in wastewater sludge and biosolids has dramatically increased due to the ubiquitous presence of emerging contaminants such PFAS, 1,4-Dioxane, microplastics, pharmaceuticals, and other refractory chemical compounds. Landfills are refusing biosolids that do not meet the strict regulatory requirements for land application. A strong case can be made for AirSCWO as a superior treatment and resource recovery technology. AirSCWO can favorably replace existing anaerobic systems or can provide on-site solids handling with resources recovery at smaller plant that do not have anaerobic digestion.

For more than 25 years, technical challenges have slowed down commercial deployment of supercritical water oxidation. Corrosion, plugging, and fouling are the common issues and linked to the complex nature of a high-pressure, high-temperature process. Critical design elements to overcome these challenges include reactor material, reactor shape, and size. The form of oxygen used is another issue as pure oxygen handling and storage introduces a process hazard causing safety

| ANALYSIS | INFLUENT | EFFLUENT STEADY STATE | REMOVAL (%) |
|--------------------------------------|----------|--------------------------|-------------|
| COD (mg/L) | 192,000 | 65-280 → | 99.97-99.85 |
| Total N (mg/L) | 4,704 | 220-420 → | 95.32-91.70 |
| NH ₃ (mg/L) | 627 | 185-325 | |
| NO ₃ ⁻ (mg/L) | 98 | 0.3-0.8 | |
| NO ₂ ⁻ (mg/L) | 22.5 | 0.04-0.54 | |
| PO ₄ ⁻³ (mg/L) | 14,500 | 13.4-63.9 → | 99.91-99.56 |

Figure 2. Duke University Pilot System (left), biosolids slurry and treated effluent and its characteristics.

concerns and increase capital expenditures to design in appropriate safety controls. Another obstacle to commercialization of supercritical water oxidation has been an unrealistic goal of producing power at a competitive retail electricity rate (\$0.3-0.5 per kWh). This has been out of reach and the cause of numerous failures.

Research and development efforts at Duke University by the founders of 374Water, Marc Deshusses and Kobe Nagar, have resolved the issues of corrosion, plugging, fouling, and the use of pure oxygen, paving the way for commercial deployment of supercritical water oxidation. Duke University designed and built a pilot version of the AirSCWO system in a standard 20-foot shipping container ("Nix1"). The Nix1 processes up to one (1) ton of sludge at 10-20% dry solids content, which is the equivalent of fecal matter from about 1000 persons per day. The pilot system resides at Duke University and has been operating since early 2015, and undergoing design optimization and testing.

AirSCWO is a novel approach to supercritical oxidation. During recent PFAS elimination work with US EPA, AirSCWO was informally called "the 3rd generation of supercritical water oxidation). It has pending US patents that address prior hurdles by incorporating moderate preheating of the waste slurry, followed by mixing with supercritical water and air. Air serves as the oxidant, a much safer alternative to pure oxygen. The internal mixing rapidly brings the waste

undergoing treatment to supercritical conditions thereby minimizing corrosion and the risks of waste charring and plugging. All organics in the sludge are rapidly oxidized to CO₂, while the heat of oxidation is recovered to heat the influent waste. The other critical innovations instrumental in overcoming corrosion, plugging, and energy efficiency challenges is a multi-stream tubular reactor configuration that enables efficient and sustainable treatment.

Each AirSCWO unit is containerized in shipping container, 20 ft for the Nix1, 40 ft for the Nix6 unit, and three 40 ft for the Nix30. This makes the AirSCWO compact and modular allowing it to integrate into the existing footprint of a wastewater plant. Units can be set up to operate in parallel, offering a number of configurations to satisfy the different throughput requirements of each unique wastewater plant. As part of our design and planning process, capital and operating expenses were evaluated for different sizes. The system is automated using sensors connected to a SCADA system and process historian for real-time analysis of trends, key process indicators (KPIs) and performance measurements.

Figure 2 shows the Nix1 pilot unit at Duke University; samples of typical influent and effluent; and a table with characteristics of influent and effluent for a typical biosolids run. A video of the operating Nix1 is available at https://youtu.be/DjF_tM3c6zo.

Innovation Spotlight

AirSCWO has successfully processed primary, secondary, and digested sludge slurries, and a range of other feedstocks including landfill leachate, and sludge streams comingled with waste oil, food wastes, and plastics. The results so far show very rapid treatment with >99.9%

conversion of organics to water, energy, CO₂ and mineral salts. Total nitrogen and phosphorous removal were over 80% and 95%. Pharmaceuticals, PFAS and other trace organic contaminants are destroyed with greater than 99.9% efficiency. All microorganisms and pathogens are eliminated.

Cost projections make the SCWO process very competitive compared to anaerobic digestion and dewatering followed by offsite disposal by land application, landfilling or incineration.



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The projected total for biosolids is \$50 per wet ton at the Nix30 scale (~30 wet tonnes/day) with a majority of the cost coming from amortizing the equipment. This cost is already competitive although the benefits of resource recovery (fertilizer, heat, and carbon credit) are not factored in those estimates, as their true value has not yet been evaluated. These cost projections make the SCWO process very competitive compared to anaerobic digestion and dewatering followed by offsite disposal by land application, landfilling or incineration.

Invent the Future – Water Resource Recovery with SCWO

AirSCWO has the ability to transform wastewater treatment plants (WWTPs) to Water Resource Recovery Facilities (WRRFs). The process recovers water, energy and phosphorus from wastewater sludge and biosolids while reducing the volume of solids by >98%. AirSCWO eliminates the methane generated by anaerobic digestion and GHG emissions from trucks hauling residuals offsite. It destroys emerging contaminants like PFAS and 1,4 dioxane, pharmaceuticals, microplastics, and antibiotic resistant bacteria, eliminating public health concerns and financial liabilities.

Air SCWO reduces operational expenses. The energy bill is lower. Off-site transportation handles a lower solids content than the biosolids prepared for off-site hauling and disposal. Finally, AirSCWO does not require side-stream processing to achieve total nitrogen discharge compliance since, unlike anaerobic digestion, the SCWO process does not generate ammonia-rich filtrate residuals. **CS**



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DEAR EXHIBITOR:

The Central States Water Environment Association (CSWEA) will be holding its 95th Annual Meeting at Monona Terrace on May 17-19, 2022. CSWEA is comprised of resource recovery professionals including facility operators and managers, consulting engineers, regulators, and educators from Wisconsin, Minnesota, and Illinois. Monona Terrace is an excellent venue and we have organized an exceptional technical program to accompany our exhibits. The CSWEA Annual Meeting provides a great opportunity for your organization to market your products and services to decision makers involved in all facets of the water pollution control field.

Reservations are now being accepted for vendor exhibition. **Each booth will include one pass for each exhibitor.** You will have the option to purchase up to three additional passes. If you plan on having more than one person at your booth, please purchase extra passes. If you register by February 4, 2022, you will have a listing in the *Central States Water* magazine showing the location of your booth on the exhibition floor, your name will be listed on the sponsors' page in the magazine, and there will be sponsor poster boards placed at key locations during the conference. **Please note the registration deadline of February 4, 2022, to have your company listed in the *Central States Water* magazine.**

The exhibits will be open two days: Wednesday and Thursday, May 18 and 19. **The conference is being arranged to provide breaks during the technical sessions with refreshments served only in the exhibit hall. We will continue the incentive pricing structure, which will bring more utility members and new attendees to the conference.**

There are also **sponsorship** options for your company. There will be sponsors for the golf outing, 5K walk/run, various event sponsorship (Meet & Greet/Social, etc.) and conference sponsorship. We want to thank you in advance for exhibiting and look forward to seeing you at the conference. Please do not hesitate to contact Lindsey Busch or Tom Mulcahy as listed below.

Sincerely,

Lindsey Busch
Carollo Engineers
Local Arrangement Chair
608-250-0763
lbusch@carollo.com

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Mulcahy/Shaw Water
Exhibit Chair
262-241-1199
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- Official Conference Planner
- E-blasts promoting the Annual Meeting

In order to ensure your company listing appears in the publications, reservation must be received by the pre-registration deadline and fees must be paid.

About CSWEA

Established in 1927, the Central States Water Environment Association is a vibrant organization of more than 1,600 water quality professionals who are dedicated to the preservation of our water environment in Illinois, Minnesota and Wisconsin.

EXHIBIT AT CSWEA'S ANNUAL MEETING

BOOTH INFORMATION

The Exhibit Area will be located in the Ballroom at Monona Terrace in Madison, WI. Exhibits will be open Wednesday and Thursday.

Each booth space will include the following:

- One 10' W x 8' D exhibit booth, ceiling is 8' high (exhibit area is carpeted)
- 8' high back drape and 3' high side rails
- One 8' skirted table
- 7" x 44" exhibitor identification sign
- Two chairs
- Electrical hook-up is **NOT** included in the registration price. All booths can have electrical connection available to them but needs to be ordered separately with registration.
- **ONE EXHIBITOR PASS**, which includes: One full access badge (admittance to Exhibit Area and technical sessions) and admission to the Tuesday Meet & Greet/Social, Exhibitor Luncheon and Exhibitor Reception

MAXIMUM OF THREE ADDITIONAL EXHIBITOR BOOTH PASSES CAN BE PURCHASED SEPARATELY FOR \$175 PER PASS (\$200 after February 4, 2022) FOR EACH BOOTH THAT YOU REGISTER.

EVENT TICKETS AND FULL CONFERENCE REGISTRATION CAN BE PURCHASED WHEN THE ATTENDEE REGISTRATION PACKAGE IS READY IN FEBRUARY/MARCH 2022.

Additional items for your booth can be ordered through **Core Expo**. Exhibitors will be notified electronically when the expo kit information is available. CSWEA assumes no responsibility or liability for any of the foregoing services performed and materials delivered.

EXHIBITOR PASS RATES

| | Before 4 Feb | After 4 Feb |
|-----------------------------------------------------|--------------|--------------|
| Exhibitor Passes (maximum of 3 per Booth) | \$175 | \$200 |
| Booth | \$750 | \$875 |
| Electrical Service | \$100 | \$100 |

Vendors that register by February 14, 2022 will be advertised in the Central States Water Magazine.

Booths will be assigned on a first-come first-serve basis (refer to booth layout).



Booth reservations will be assigned by the Local Arrangements and Exhibits chair based on the optimal arrangement, taking in to consideration vendor type and available space.

PREFERENCE WILL BE GIVEN TO VENDORS BASED ON PAST PARTICIPATION.

Exhibitors that want to be located next to each other should indicate so in their application. While we try to be fair in the allocation of exhibitor space, no allocation is perfect, and we appreciate your flexibility in this matter.

EXHIBIT HALL SCHEDULE

| Tuesday, May 17 | |
|---------------------|---------------------------------|
| 2:00 PM - 6:00 PM | Exhibitor Set-Up |
| Wednesday, May 18 | |
| 6:00 AM - 8:00 AM | Exhibitor Set-Up |
| 8:00 AM - 6:00 PM | Exhibit Area Open |
| 10:15 AM - 11:00 AM | Exhibit Only Hour |
| 12:00 PM - 1:00 PM | Exhibitor Lunch |
| 4:00 PM - 6:00 PM | Exhibit Reception |
| Thursday, May 19 | |
| 8:00 AM - 12:00 PM | Exhibit Area Open |
| 9:30 AM - 10:30 AM | Exhibit Only Hour (Posters Too) |
| 12:00 PM - 3:00 PM | Exhibit Breakdown |

Times are subject to change and will be confirmed with the Full Conference Registration Packet.

EXHIBITOR OFFERINGS

In order to ensure that the Exhibit Hall has good traffic and that Exhibitors have ample networking opportunities, we offer the following:

- Exclusive exhibit hall hours: No technical sessions will be held during this time
- Longer breaks during the Technical Sessions
- Coffee breaks and refreshments in the Exhibit Hall
- Wednesday Lunch and Reception in the Exhibit Hall
- Utility Rate for increased traffic
- Global Water Stewardship Silent Auction in Exhibit Area
- Sponsorship Opportunities
- Listing in the Daily Planner/App
- Career networking opportunities



CAREER NETWORKING OPPORTUNITIES

Please help keep our water sector strong. We will have opportunities for job seekers and employers to connect throughout the conference. Building a strong water workforce is something important today and in the future. All who are interested in meeting new candidates, looking for career growth, or learning about opportunities should participate. Exhibitors may participate by encouraging attendees with career growth questions to seek your input while at your exhibit booth. Your booth will be marked with a balloon. Just indicate your commitment on the registration form. *Participate in this opportunity to inspire, engage, and recruit the next generation of water professionals.*

TECHNICAL PROGRAM

The CSWEA Annual Meeting technical program is the best in the Midwest and attracts many engineers, utility managers, plant superintendents, academics, and students. We feature over 60 presentations on the following topics: Collection Systems, Digestion, Energy Production, Recovery and Efficiency, Ethics, Industrial/Pretreatment, Information Technology, Leadership/Soft Skills, Nutrients, Operations & Maintenance, Research & Design, Residuals, Solids and Biosolids, Resource Recovery, Stormwater, Utility Management, Water Reuse, Watersheds, and Stormwater Management.

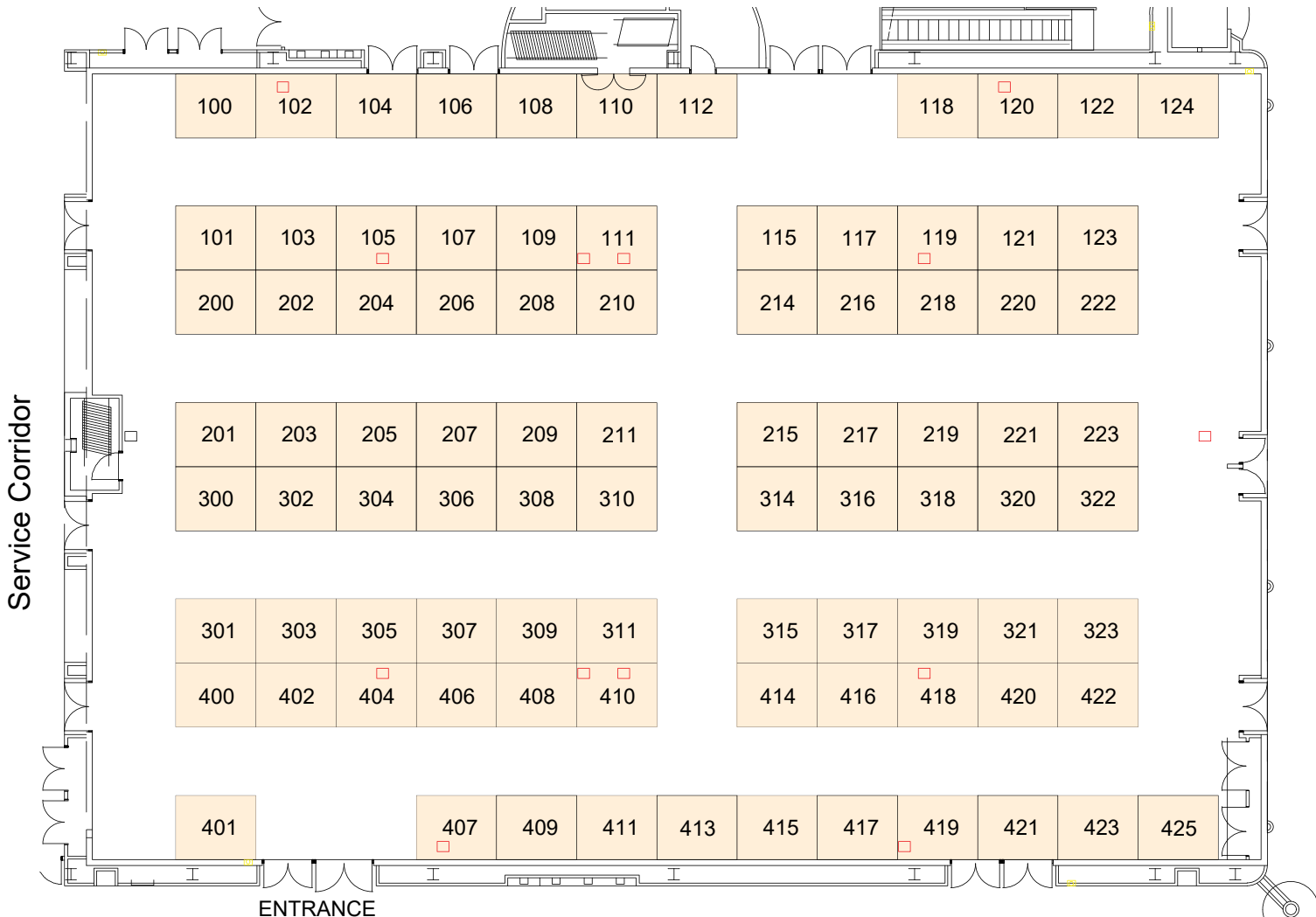
CONNECT WITH WATER PROFESSIONALS

CSWEA's Annual Meeting has some of the best attendance of a regional conference focused on professionals in the water quality field due to our high quality programming; our attendance numbers continue to increase over the years.

ANNUAL CONFERENCE REGISTRATIONS (IN-PERSON)

| | |
|------------------------|-----|
| 2019 - Madison, WI | 480 |
| 2018 - Oakbrook, IL | 477 |
| 2017 - St. Paul, MN | 499 |
| 2016 - Madison, WI | 480 |
| 2015 - Oakbrook, IL | 567 |
| 2014 - St. Paul, MN | 428 |
| 2013 - Madison, WI | 384 |
| 2012 - St. Charles, IL | 316 |

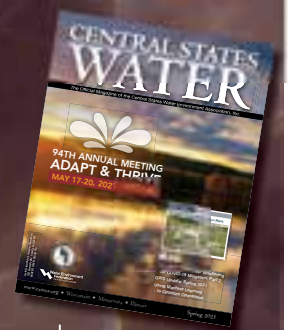
EXHIBIT HALL FLOOR PLAN



BECOME AN ADVERTISER

WITH 50 YEARS OF EXPERIENCE REACHING THE WATER QUALITY INDUSTRY, WE KNOW YOUR AUDIENCE.

SINCE 2007, THE CENTRAL STATES WATER MAGAZINE HAS BEEN A LEADING VOICE IN THE WATER QUALITY INDUSTRY. Today, each quarterly issue averages nearly 76 news-packed pages. Advertisers benefit from themed editorial and targeted messaging opportunities. Regional events and member reports round out the content. Additionally, **the CSWEA Annual Conference & Exhibit Program** reaches more than 2,500 industry-leading professionals. Get increased exposure for your company by advertising in the multiple publications.



EXHIBITOR RULES and REGULATIONS

1. LOCATION OF EXHIBITS: The conference will be held at Monona Terrace in Madison, WI. All measurements and booth layouts shown on the floor plan are as accurate as possible, but the Central States Water Environment Association (CSWEA) reserves the right to make such modifications and changes in booth assignments as may be necessary to adjust the floor plan at any time to meet the needs of CSWEA, its Attendees and Exhibitors.

2. EXHIBITOR EQUIPMENT AND SERVICES: Standard booth size is 10'W x 8'D with a ceiling height of 8' high unless otherwise noted on the floor plan. Each booth will include one 8' skirted table, two chairs, side-rails and drape backdrop for each booth in addition to one company identification sign. Exhibitors shall notify the CSWEA office with any specific requests pertaining to oversized equipment or other items. CSWEA holds the right to deny exhibitors permission to show specific pieces of equipment, displays, etc., based on dimensions and/or weight.

3. APPLICATIONS: Applicants must use the Exhibit Space Application or Online Form to request a booth space. Payments must accompany the application and contract. Return Exhibit Space Applications to CSWEA by email to ahaque@cswea.org or mail to: CSWEA, 1021 Alexandra Blvd, Crystal Lake, IL 60014 or online at www.cswea.org.

4. ASSIGNMENT OF SPACE: Booth reservations will be assigned by the Local Arrangements and Exhibits chair based on the optimal arrangement, taking in to consideration vendor type and available space. Exhibitors who wish to avoid assigned space adjacent to that of another exhibitor should so indicate on the application. Exhibitors who desire assignment next to each other should submit their applications together; however, each will need to submit a separate application form. Booth assignment information will be forwarded to the exhibitors within a reasonable time prior to the Conference.

5. EXHIBITOR SERVICE KIT: The kit will be provided by Valley Expo and will contain order forms and shipping instructions from the official service contractor for your booth space. Exhibitors will be notified electronically. Note: Electrical hook-up is NOT included in the registration price. All booths can have electrical connection available to them but needs to be ordered separately.

6. INSTALLATION OF EXHIBITS:

Tuesday, May 17, 2:00 PM to 6:00 PM
and Wednesday, May 18, 6:00 AM to 8:00 AM.
All exhibits must be set up by 8:00 AM on May 18.

7. EXHIBIT HOURS

Wednesday, May 18, 8:00 AM to 6:00 PM
Thursday, May 19, 8:00 AM to 12:00 PM

8. DISMANTLING OF EXHIBITS: No packing or dismantling of exhibits will be allowed until the official closing of the exhibit area at 12:00 PM on Thursday, May 19. Failure to abide by this policy will result in loss of booth selection preference priority for the 2023 Annual Meeting. All exhibits must be removed from the exhibit area by 3:00 PM on Thursday, May 19. Materials not removed by this time will be put in storage at the Exhibitor's expense. There is no space available for storage of empty cartons, crates, etc. Arrangements may be made with the exhibit service contractor for storage.

9. EXHIBIT SET-UP AND DISMANTLING, including unloading and loading of materials and equipment, is governed by guidelines for the facility and may involve Union Rules. Please check with the exhibit service contractor for any specific rules that may apply. Loading dock and freight elevator are available. Electrical is available for an additional fee. Please purchase electrical connection with your exhibitor registration.

10. EXHIBIT FACILITY: The Exhibitor assumes responsibility and liability for losses, damages and claims arising out of injury or damage to the Exhibitors' displays, equipment and other property brought upon the premises of the Monona Terrace and shall indemnify and hold harmless Monona Terrace and CSWEA and their agents, servants, and employees from any and all such losses, damages and claims. There is no other agreement or warranty between the Exhibitor and CSWEA except as set forth in this document. The rights of CSWEA under this contract shall not be deemed waived except as specifically stated in writing and signed by an authorized officer of CSWEA.

11. SECURITY AND INSURANCE: The Exhibitor is solely and fully responsible for their own exhibit material and should insure their exhibit against loss or damage from any causes whatsoever. All property of the Exhibitor is understood to remain in its care, custody, and control in transit to or from or within the confines of the Monona Terrace .

EXHIBITOR RULES and REGULATIONS (continued)

12. CARE OF BUILDING AND EQUIPMENT: Exhibitors or Agents, must not injure or deface the walls or floors of the building, the booths, or the equipment of the booths. When such damage appears, the Exhibitor is liable to the owner of the property so damaged. All materials used in decorations must be flameproof. Electric wiring must conform to Electric Code Safety Rules, and all applicable fire laws, electrical codes and other laws, which affect the installation, conduct and disassembly of the exhibit. Combustible material, fireworks or explosives are not permitted in the exhibit hall. Motor vehicles, engines, motor or machinery are not permitted in the exhibit hall. Helium balloons are only allowed if they are securely anchored to exhibits. Absolutely no helium balloons may be given away or sold. If balloons are lost, the Exhibitor shall be responsible for the balloon removal fee according to the current prices list. Exhibitors cannot give out food and beverage that is not relevant to their business. Candy samples are permitted. All other food and beverage items must be purchased through Monona Terrace. The Exhibitor shall also comply with all reasonable requests of officials of the Monona Terrace with respect to installation, conduct and disassembly of its exhibit.

13. CANCELLATION OF EVENT: In the event that it is necessary to cancel a portion of or all of the CSWEA 95th Annual Conference and the exhibits, due to any cause beyond the direct control of CSWEA including, but not limited to the damage or destruction of the convention and exhibit building, labor strikes, pandemic restrictions, or adverse weather conditions, the Exhibitor shall be reimbursed only for actual direct costs not incurred by CSWEA that are covered under CSWEA's insurance policy.

14. CANCELLATION OF EXHIBIT REGISTRATION: In the event that an Exhibitor desires to cancel a reservation, CSWEA must receive a request for cancellation in writing at least 15 business days prior to the event. A refund will only be granted if CSWEA is able to fill the reserved booth with a replacement Exhibitor. Exhibitors that fail to show for the Conference or do not setup their booth within the guidelines established, will result in loss in booth selection preference priority for the 2023 Annual Meeting.



SILENT AUCTION

Attract More People to Your Booth and Help Provide Safe Water through CSWEA's Global Water Stewardship

www.globalstewardship.org



**GLOBAL WATER
STEWARDSHIP**

Donate an item to the Silent Auction

This year, auction items donated by exhibitors will be displayed in the Exhibit Hall area with a "CSWEA Global Water Stewardship Silent Auction" indication at each participating exhibitor's booth. A master list of auction items, exhibitor's name and booth number will also be displayed at the conference.

Join your fellow exhibitors in supporting this worthy global CSWEA initiative and donate an item... and increase your booth traffic at the same time!

Past Donations Include:

| | | | |
|-----------------|-------------------------|---------------|-------------------------|
| Golf Clubs | Golf Packages | Cameras | iPad or Android Tablets |
| Tools | Wine and Cheese Baskets | Arts & Crafts | Sporting Event Tickets |
| Wildlife Prints | Sports Memorabilia | Fishing Trips | Concert Tickets |

Contact Tricia Garrison for details (920-438-1064, tgarrison@newwater.us)

HOTEL INFORMATION

There are four official conference hotels in downtown Madison affiliated with the 95th Annual Meeting.

The Hilton Madison Monona Terrace is on 9 East Wilson Street. Book a standard room by visiting by calling 608-255-5100. Ask for the CSWEA rate, which starts at \$183/night.

The Best Western Premier Park Hotel is on 22 South Carroll Street. Rooms are available for reservation on <https://bit.ly/3lllK7Z> or by calling 608-285-8000. Reference the "CSWEA Annual Meeting 2022" to get the discounted rate, starting at \$169/night.

The Hampton Inn & Suites Madison Downtown is located on 440 W Johnson Street. Rooms are available for booking at <https://bit.ly/3lvY4kn> or by calling 608-255-0360 and mentioning CSWEA 2022 for the discounted rate of \$139/night.

The AC Hotel Madison Downtown is on One North Webster Street. Book a room by visiting <https://bit.ly/3CjxLDE> to get the discounted rate, which starts at \$169/night.

We expect that there will be great demand for these rooms, so please book early.



MAXIMIZE THE IMPACT OF YOUR 95TH ANNUAL MEETING EXHIBIT

If you are exhibiting at this outstanding marketing event, being part of the *Central States Water Spring Show-Guide* issue is a must!

Advertise in this issue as 1/4 page (\$575) or larger and you will receive:

- An enhanced exhibitor listing (25 word write-up)
- A great looking display stand to showcase your ad and your support for CSWEA's publication (will be dropped off at your booth)
- Unbelievable exposure prior to the event and bonus distribution at the show
- *Central States Water* will be made available to attendees and will be handed out to all exhibitors

The Spring Issue Will Feature:

Session Times • Exhibitor Listings • General Information • Floor Plan • Scheduling • And More!

DEADLINE: February 4, 2022

For more information please contact Jeff Kutny, Marketing Manager
Toll Free: 866-985-9789 Email: jeff@kelman.ca





Currently, over 35% of the earth's population lacks access to proper sanitation. That's more than 1 in 3 people.

This leads to billions of gallons of untreated wastewater being discharged directly to rivers, ponds, and streams – leading to both disease and environmental degradation.

GLOBAL WATER STEWARDSHIP (GWS) IS AN ORGANIZATION FORMED BY CSWEA THAT RESOLVES SANITATION ISSUES IN THE DEVELOPING WORLD BY EDUCATING PEOPLE AND ENGINEERING SUSTAINABLE CENTRALIZED SOLUTIONS THAT KEEP WATERWAYS CLEAN AND COMMUNITIES HEALTHY.

We've started work in Costa Rica. This nation is developing quickly, and needs to improve their water treatment infrastructure in order to keep up with their economic growth. A large portion of their economy depends on tourism, which is being driven away due to the lack of waste management that leads to disease and odors.

Help us protect Costa Rica's incredible and abundant biodiversity, improve public health, and develop local economies.

When you invest in us, we invest in the world. For more information, please visit www.globalwaterstewardship.org

DIGITAL ADVERTISING OPPORTUNITIES

In addition to in-person opportunities, we will offer a virtual platform with presentations and exhibitor space.



We invite you to sponsor and advertise on the official Conference App, as well. The in-person annual meeting will be held from May 17-19, 2022. Pre-recorded presentations will be posted for several months in the virtual platform after the event. Multiple opportunities exist to integrate your company into the virtual Pheedloop program, conference advertising and social media promotion, ensuring you get maximum exposure. The Conference App will be used as the daily planner, for registrations, and for abstract submissions; both by in-person attendees and virtual attendees.

Advertiser content will be seen by wastewater industry decision makers in Minnesota, Wisconsin, and Illinois – skyrocketing your outreach toward CSWEA's vast community of water professionals. [Sign up at www.cswea.org!](http://www.cswea.org)

DIGITAL EXHIBIT OPPORTUNITIES

CSWEA is offering many ways for you to market your company:

Exhibitor Registration (Included with Booth)

- Exhibit Hall Listing & Portal in Pheedloop
- Visitor Data in Pheedloop
- Face-to-Face Video Calls & Chat Feature
- Listing in Central States Water

Lead Retrieval - \$100

- Real-time leads

Product/Service Showcase - \$300

Present a unique and refreshing 10-minute product or service demonstration. Your prerecorded presentation will be scheduled on demand to add value to sponsor and attendees.

Register by **February 4, 2022** to be listed in the Spring edition of Central States Water magazine.

WHY EXHIBIT WITH CSWEA?

- Connect with water professionals.
- Advertise your services and products
- Multiple channels for promotion and impressions
- Build brand recognition and loyalty
- Show your support for water professionals



Stronger Together

DIGITAL ADVERTISING OPPORTUNITIES

For 2022, we will continue using the Pheedloop Virtual Meeting Platform as the Conference App. Pheedloop offers multiple a la carte advertising opportunities, in addition to what is included with Sponsorships.

Session Commercial Video - \$500

Your pre-recorded one-minute commercial will be scheduled to play twice during Technical Sessions. The looping video is played on repeat before a session is live in the virtual portal (20 spots available).

Session Sponsorships - \$100 per 2 sessions

Your company logo will be displayed for your chosen sessions in the session listing and the session detail pages.

Virtual Event Carousel –

Included with Platinum, Gold & Silver Sponsorship

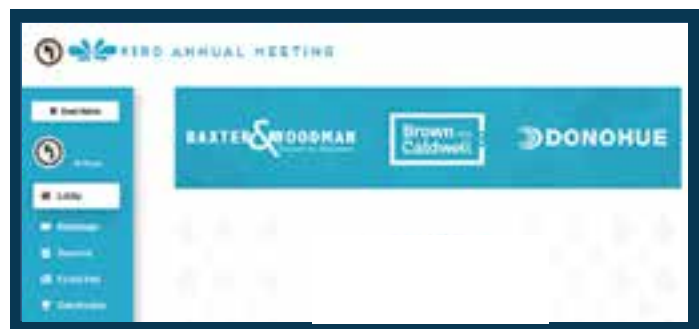
Your company logo will be displayed on a rotating banner on the upper right hand side of the site.



Virtual Portal Lobby Banner Image

– Included with Platinum & Gold Sponsorship

Your company logo will be displayed on a rotating banner on the main lobby page



Virtual Portal Login Logo

– Included with Platinum Sponsorship

Your logo will be displayed on the highly visible virtual portal login page.



SPONSOR PROGRAMS

SPONSORSHIPS

CSWEA will once again be offering **Annual Sponsorship** packages that combine our Annual Meeting sponsorships as well as Sponsorships of our State Section Events. Different packages are available as outlined below. As a volunteer, non-profit association, we value contributions at all levels and thank you for your consideration.

ANNUAL SPONSORSHIP PACKAGES

Go, Pack(ers), Go!

\$6,000

- Wisconsin Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Skol Vikings!

\$6,000

- Minnesota Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Bear Down!

\$6,000

- Illinois Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Midwest All-Star!

\$8,000

- Wisconsin, Minnesota and Illinois Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

For questions or inquiries, contact Amy Haque at ahaque@cswea.org

| | | | |
|--------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------|---------------|
| COMPANY Info that will appear on Badges, Website and Directory | | CONTACT INFO Instructions and Booth Information will be sent to this person | |
| Company Name (as it should appear in listings) | | Contact Name (Exhibitor Pass # 1) | |
| Address | | Contact Address | |
| City, State, Zip Code | | City, State, Zip Code | |
| Phone Number | Website | Contact Phone Number | Contact Email |
| Names of Additional Exhibitors (Passes need to be purchased below) | | | |
| _____ | | | |

Career Networking Participation (Booth identified for attendees to inquire on career opportunities – refer to brochure) YES/NO

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| QUESTIONS? Contact Amy Haque at ahaque@cswea.org or (855) 692-7932 x1 | |
| <p>Each booth space will include the following: • One 10' W x 8' D exhibit booth, ceiling is 8' high (exhibit area is carpeted) • 8' high back drape and 3' high side rails • One 8' skirted table • 7" x 44" exhibitor identification sign • Two chairs • ONE EXHIBITOR PASS, which includes One full access badge (admittance to Exhibit Area AND technical sessions) with admission to the Meet & Greet/Social, Exhibitor Luncheon and Exhibitor Reception. A MAXIMUM OF 3 ADDITIONAL EXHIBITOR BOOTH PASSES CAN BE PURCHASED FOR EACH BOOTH THAT YOU REGISTER. EVENT TICKETS AND FULL CONFERENCE REGISTRATION CAN BE PURCHASED WHEN THE ATTENDEE REGISTRATION PACKAGE IS READY IN FEBRUARY 2022</p> | |

| REGISTRATION & PAYMENT INFO | QTY | Before Feb 4 | | After Feb 4 | TOTAL |
|-------------------------------------------|-----|--------------|----|-------------|-------|
| BOOTH REGISTRATION (Includes 1 pass) | | \$750 | or | \$875 | |
| EXHIBITOR PASSES (maximum of 3 per Booth) | | \$175 | or | \$200 | |
| ELECTRICAL SERVICE | | \$100 | or | \$100 | |

TOTAL REGISTRATION AMOUNT _____

PAYMENT INFORMATION

| | | |
|--------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CREDIT CARD | | AMOUNT ENCLOSED |
| Credit Card Number | | CHECK NUMBER |
| Expiration Date | CCV | Registrations can be completed online at www.cswea.org or mailed if paying by check or credit card. Registrations must be postmarked by Feb 4 to receive the discounted pricing. Mail to CSWEA, 1021 Alexandra Blvd, Crystal Lake, IL 60014 |
| Signature | | |

TERMS & CONDITIONS

1. This agreement shall be made and effective only upon acceptance by both CSWEA and the exhibitor.
CSWEA reserves all rights to the Exhibit and may reject any and all proposed agreements or make reassignments as necessary.
2. The exhibitor agrees to abide by all terms, conditions, and regulations set forth in the EXHIBITOR RULES and REGULATIONS.

Authorized Signature _____ Date _____

Print Name of Signature _____

SPONSORSHIP APPLICATION

| | | | |
|------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------|---------------|
| COMPANY Info that will appear on Website, Directory and Apps | | CONTACT INFO Information on Sponsorship will be sent to this person | |
| Company Name (as it should appear in listings) | | Contact Name | |
| Address | | Contact Address | |
| City, State, Zip Code | | City, State, Zip Code | |
| Phone Number | Website | Contact Phone Number | Contact Email |

QUESTIONS? Contact Amy Haque at ahaque@cswea.org or (855) 692-7932 x1

Your sponsorship of this event will support the Student Design Participants, Student & Young Professional Activities, Global Water Stewardship, Exhibit Luncheon & Reception Expenses, Printing, App Development, Keynote Speaker expenses and other costs associated with this important conference. Different levels of Sponsorships are shown below. Sponsors will be proudly displayed throughout the conference facility, including signs at the venue and event, daily planner, eblasts and attendee registration packets. In order to ensure maximum exposure, please sponsor early. We thank you for your support.

| CONFERENCE SPONSORSHIP | | EVENT SPONSORSHIP | |
|-----------------------------------|---------|----------------------|-------|
| PLATINUM* | \$2,500 | GOLF EVENT | \$300 |
| GOLD | \$1,500 | 5K WALK/RUN | \$150 |
| SILVER | \$1,000 | MEET & GREET SOCIAL | \$500 |
| BRONZE | \$500 | ASSOCIATION LUNCHEON | \$500 |
| * Includes Logo on Conference App | | ANNUAL BANQUET | \$500 |

| ANNUAL SPONSORSHIPS | A La Carte | Go, Pack(ers), Go! | Bear Down | Skol! Vikings | Midwest All-Stars |
|----------------------------------------------|------------|--------------------|----------------|----------------|-------------------|
| Minnesota Section Platinum Sponsor | \$1,000 | | | x | x |
| Wisconsin Section Platinum Sponsor | \$1,000 | x | | | x |
| Illinois Section Platinum Sponsor | \$1,000 | | x | | x |
| Annual Meeting - Platinum Sponsor | \$2,500 | x | x | x | x |
| Annual Meeting - Golf Outing Sponsorship | \$300 | x | x | x | x |
| Ops Challenge Sponsorship | \$500 | x | x | x | x |
| Student Design Competition Sponsor | \$350 | x | x | x | x |
| WEFTEC Reception Sponsorship | \$350 | x | x | x | x |
| Global Water Stewardship - Corporate Steward | \$1,000 | x | x | x | x |
| Total (please Circle your choices) | | \$6,000 | \$6,000 | \$6,000 | \$8,000 |

TOTAL SPONSORSHIP AMOUNT _____

PAYMENT INFORMATION

| | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----|
| CREDIT CARD | | |
| Credit Card Number | Exp. Date | CCV |
| Signature | | |
| CHECK | | |
| Amount Enclosed | Check Number | |
| <p>Sponsorships can be purchased online at www.cswea.org or mailed if paying by check or credit card. Mail to CSWEA, 1021 Alexandra Blvd, Crystal Lake, IL 60014</p> | | |

The Stockholm Junior Water Prize (SJWP) is the world's most prestigious youth award for a water-related science project. The prize taps into the unlimited potential of today's high school students as they seek to address current and future water challenges.

STOCKHOLM JUNIOR WATER PRIZE WINNER (WISCONSIN)



Anna Wang

Grade 11
West High School

TITLE

An Investigation into the Removal
of Dyes and Plastic Microfibers from Wastewater

SUMMARY

The textile industry is one of the most polluting industries in the world, with a fifth of water pollution coming from just the dyeing and finishing steps of the textile manufacturing process alone. Thus, I used this project as an opportunity to combine my interest in fashion with environmental science, and was able to design a new method for dye and plastic microfiber removal. Currently, powdered activated carbon is not used for industrial purposes because its small size makes it difficult to remove from the water after use. However, it's less costly and more efficient than granular activated carbon, which is being used industrially right now, and has higher possibilities of being created from transformed food waste, allowing for a more environmentally sustainable solution.

Through my project, I found a way to utilize powdered activated carbon for dye removal while simultaneously removing microfibers and separating the powdered activated carbon from the water by using the nonpolar property of oil. I measured the percentage of pollutant removal for each material by measuring light intensity through the sample by a photometer I built at home, and converting the light intensity values to percentages using calibration curves, and using T-Tests to determine statistical significance. From my results I concluded that the dye was best removed by activated carbon, microfibers by oil, powdered activated carbon by oil, and the oil by magnetite. By just using four low cost materials (powdered activated carbon, oil, magnetite, a magnet), five pollutants were removed (dye, plastic microfibers, powdered activated carbon, oil, magnetite). Finding a sustainable, low cost, efficient method to clean our textile wastewaters is especially crucial during our current environmental crisis, in the face of fast fashion. I believe my project was a successful concept test that can be further improved to create a more viable solution. This study may contribute to the development of a more cost efficient textile wastewater treatment system that targets both dyes and plastic microfibers. I plan to continue researching this topic to gain a greater understanding of the science behind my results and eventually build a working prototype.

BIOGRAPHY

Anna Wang is a 16-year-old junior at West High School in Madison, Wisconsin. Since elementary school, she has been conducting science experiments at home in her free time and began entering science fairs in middle school. For the past three years, her projects have revolved around environmental science, ranging from topics like extending the shelf life of fresh produce to increasing the stability of solar cells. Her interest in this field was developed during high school when she became more exposed to the environmental dangers our planet currently faces and realized the urgency of the situation, prompting her to take action through both scientific and political means. Outside of science, Anna enjoys playing lacrosse, reading, and partaking in social justice activities. [CS](#)

Extensive research has been conducted on using AC for wastewater treatment, and my results of the powdered AC being effective at adsorbing dye are consistent with others' due to the consistent adsorption abilities of AC.

DISCUSSION

The results obtained from this study suggest that powdered AC has potential to be used for textile wastewater treatment purposes if ferrofluid is added to cause flocculation and easier filtration, as well as to remove microfibers. However, disadvantages other than removal difficulty of powdered AC must be considered before industrial use is feasible. The small particle size 1) leads to a large pressure drop across a bed of carbon, 2) produces large amounts of sludge, and 3) makes it challenging to regenerate. Thus, if the process is not modified, continuously using powdered AC can have a higher cost than granular AC. Therefore, it is necessary to make efforts toward finding ways to resolve these issues. In the future, I would like to investigate further into the regeneration of powdered AC to make the process less costly and more environmentally sustainable. Because the method created in this study with the combined use of powdered AC and ferrofluid is entirely novel, there is a lack of research available to compare with in regards to the data obtained and optimization techniques. Nevertheless, extensive research has been conducted on using AC for wastewater treatment, and my results of the powdered AC being effective at adsorbing dye are consistent with others' due to the consistent adsorption abilities of AC.

The most novel component of this study is the use of ferrofluid in wastewater treatment. Oil has always been viewed as a pollutant rather than a tool to not only remove microfibers but also powdered AC. But it must be acknowledged that despite its benefits, oil is still a pollutant that needs to be removed after usage. Among other drawbacks, releasing oily waters into the environment contributes

to decreasing oxygen levels in the water and harming animals, such as covering birds' feathers and preventing them from flying. During experimentation, this issue was approached in two ways: the AC removed a portion of oil during the flocculation process; and the addition of magnetite to oil (ferrofluid) caused the mixture to be attracted to a magnet and removed from the water. It's necessary to optimize this process and find ways to either remove oil so none (or a negligible amount) remains, or replace oil with a different material that fulfills the same purposes. Although the exact mechanism was unable to be proven in this study due to limitations in resources, because oil was chosen as a material to be tested due to it being less dense than water and its nonpolarity, perhaps testing other materials with similar properties would yield comparable outcomes. In addition, using a more precise method to measure the pollutant removal would offer more accurate results, especially for microfibers since it did not have a large effect on light intensity.

The final consideration of cost is crucial to developing a feasible wastewater treatment method. This study was a concept test that proved the abilities of powdered AC and ferrofluid, but further efforts at creating a prototype must be pursued in order for an accurate cost analysis to be performed. However, it's important to note the possibility of transforming food waste (i.e. potato peels, apple pulp, bamboo) into AC could increase the appeal of using powdered AC since most food waste have low densities and weak structures, allowing for easier creation of AC in the powdered form, rather than granular, which requires raw materials with higher densities and stronger structures.

CONCLUSIONS

The following two hypotheses were tested and accepted: If the combined use of AC and ferrofluid were employed in the treatment of textile wastewater, 1) the combined use of AC and ferrofluid will remove more dye and fibers than only AC and only ferrofluid, as AC would adsorb the dye and oil in the ferrofluid would attract the nonpolar microfibers; and 2) the oil will separate the powdered AC from water, as the adsorbed oil will cause the AC to flocculate.

The following conclusions were reached after the data from all four phases were analyzed with simple statistics and T-Tests:

1. AC was the best at removing dye, but the addition of ferrofluid did not hinder its abilities. In Phase 2 with the isolation of dye, the AC and combination of AC & ferrofluid both removed around 87%, with no statistical significant difference between them.
2. Oil was the true removal agent of microfibers. In Phase 3, oil alone removed 77%, and the addition of magnetite to it didn't change this value, suggesting that magnetite, which had no effect on the removal of any pollutants, also didn't hinder oil's abilities.
3. AC had a significant effect on the removal of microfibers, but not to an effective extent on its own. In Phase 3, it only removed around 41% of microfibers, but 91% with the combined use of ferrofluid.
4. Oil caused powdered AC to flocculate in water, making it easier to filter out. Oil alone and ferrofluid removed around 96% of the AC, but magnetite removed 0%, proving that oil was the true removal agent of AC. [CS](#)

2021 WATER'S WORTH IT ESSAY CONTEST WINNERS

The Central States Water Environment Association recently held its 2021 Water's Worth It Essay Contest in Illinois and Wisconsin. Applicants in grade 6 through 8 submitted either a creative writing essay or research essay on Optimism in the Face of a Global Water Crisis. Thanks to all who participated this year and congratulations on the winners in each state.



ILLINOIS



1ST PLACE | Research Category |

Myna Mallipeddi, Quest Academy

Myna is 13 years old and is from Chicago, IL. Her favorite class is science and she enjoys writing, music, painting, and dance. Myna loves water because it is hydrating, refreshing, and fun to swim in!

MYNA'S ESSAY

As the population continues to increase due to migrant influx and precipitation remains unpredictable due to climate change, Jordan remains one of the world's most water-scarce countries. According to HELI Technical Advisory Group in Jordan, "The challenge is to manage a most limited vital resource in a way that best responds to the growing needs and nurtures the health of the next generation."

The country's renewable water supply currently meets approximately half of the population's water demands, with groundwater used twice as quickly as it can be recharged. The desiccated country has seen limited rainfall, and with the population increasing over the last 20 years, an estimated 10 million people currently reside in Jordan. In 2019, Jordan was ranked the fifth most water-stressed country in the world. Continuing changes in rain patterns and climate threaten to exacerbate the problem.

Financial hurdles exist, but both government agencies and private organizations are taking measures to address Jordan's water crisis. Jordanians must ration their water effectively for cooking, bathing, and

drinking because there is not enough water for the whole country. The rationing of water is causing tension between native Jordanians and refugee populations. The United States Agency of International Development (USAID) is responsible for administering foreign civil aid and development assistance. "USAID plans to upgrade and expand Jordan's water and wastewater infrastructure through projects like the Zara Ma'in Water Treatment Plant, the Amman Improvement Water Network, and the construction and expansion of the Tafileh and As-Samra Wastewater Treatment Plants to increase the availability of drinking water and improve sanitation for millions of Jordanians." (www.usaid.com)

Many new ideas for conserving and repurposing water sources are surfacing. Jordan has been trying to improve their irrigation and water system for more efficient use and conservation. People worldwide are trying to help places like Jordan where people struggle to survive on strict water rations. VICI Labs developed a device called the Water Seer: "It can pull moisture from the air and produce up to 11 gallons of clean

drinking water. It blows wind into an underground chamber that condenses and forms water. There have not been many field tests yet, which has caused critics to raise an eyebrow. Hopefully, the machine does its job and can help produce clean drinking water for countries that have limited access to it." (www.borgenproject.org)

The Desalinator, another device currently being used in water-scarce countries, can convert saltwater into freshwater, thereby slowing water scarcity to solve the water crisis. Another new technology, the Omni-Processor, boils sewage water and processes the resultant water vapor into drinkable water. "Alongside the water and electricity benefits, this innovative technology also provides clean and safe disposal of human waste. This sanitation solution could provide help to the 2.6 billion people who do not have access to adequate sanitation." (www.drop4drop.com)

New technologies help restore water in countries like Jordan deprived of it. They allow everyone to have access to water throughout the world and solve many problems related to cooking, bathing, and drinking water. **CS**



ILLINOIS



2ND PLACE | Research Category |

Michelle Fanjoy, Bednarcik Junior High School

Michelle is 13 years old and from Aurora, IL. Her favorite class is science and she enjoys figure skating and playing the flute. Michelle is grateful for clean water, as it is the only beverage she drinks!

MICHELLE'S ESSAY

In the US, people often take for granted the abundance of water open for access, often leaving the sink running or washing the dishes in running water, whereas in places like Mexico City, citizens struggle to simply obtain clean water. Often rain is the only way for the citizens to shower, wash clothes, or cook. Having one of the largest populations of any city at over 20 million people, Mexico City's massive water shortage is even more devastating than it would be in other regions.


To help alleviate the issue, the local government in Mexico City is currently trying to repair the deteriorating infrastructure that loses more than 40% of the city's water through leaks. Even though they are trying, the issue may never be fully addressed due to the cost of repairs being unrealistic from a financial perspective. Some estimates state that repairs to this infrastructure would cost the city as much as \$13.6 billion over a 40-year span. Increased investment from

both local and national government as well as financial contributions from other nations could assist in supporting the effort, however convincing other nations to be involved in such a localized issue would be exceedingly difficult.

Additionally, transportation of water from outside regions could help increase the supply to the city. Efforts are currently employed to do so, however Mexico City's altitude and distance from the source of water make the cost of this form of transportation challenging. Increased innovation and investment in water transportation would increase the supply through these means. The steps to succeed at this would first be to convince neighboring nations to help and then to peacefully convince them to invest in aqueducts or canals, since funding would be a problem for Mexico City to construct these solutions itself.

Lastly, the majority of Mexico City's water supply is stored in aquifers underneath the city. Aquifers are

underground layers of rocks that rainfall and other forms of water can seep through. Water from Mexico City's aquifers is transported to the citizens both reducing the city's water supply and destabilizing the city's foundation causing it to slowly sink into the earth. Currently, there are no significant governmental efforts to help fix the aquifer issue, but replenishment of these aquifers would increase the city's depleted water supply and help stop the city from sinking. An ideal solution would be a rainwater collection system that funnels water into the aquifers to replenish the water supply, although the challenge would be finding the space to do so and the funds to pay for it.

Ultimately, even though Mexico City is currently attempting parts of these solutions, none of them would completely solve the problem alone. However, the hope is that a combination of convincing other nations to contribute, investing in water transportation, and replenishing the aquifers could do so. 



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ILLINOIS



1ST PLACE | Creative Writing Category |

Anika Lovisa, Kennedy Junior High School

Anika is 13 years old and from Naperville, IL. Her favorite class is Language Arts and she enjoys reading, painting, running, baking, and playing the oboe. Anika says the coolest thing about water is its ability to sustain all life on Earth!

ANIKA'S ESSAY

August 6, 2029 – Western Sahara

I squinted into the horizon, straining my eyes to catch a glimpse of Abdul returning home through the harsh winds and swirling red sand clouding my vision. My throat ached at the thought of water and I sent up a silent prayer that today there would be something to drink. I was a Sahrawi refugee, and none of us had water. The Western Sahara conflict displaced thousands, including my family. The arid desert climate and long-lasting drought are all I've ever known. I closed my eyes and conjured up the memory of gulping down crisp, cool water to distract myself from the agonizing wait. I imagined that the obstinate burn lingering in my throat was assuaged. Basking in the almost-real sense of relief, I nearly didn't hear Abdul approaching, his feet creating soft puffs in the sand Pfft. Pfft. Pfft. My eyes fluttered open and I ran to him. I tried to call out, but found myself letting

out only a weak croak. I swallowed hard and tried again.

"Is there water?" I called out.

Wearily, he replied, "Some."

He slowly extended his hand, offering me the dirt-caked canteen. I eagerly snatched it from him and took a shallow swig. The water was lukewarm and felt gritty as I swallowed, but I was grateful nonetheless as the wetness bloomed over my dry, cracked lips. My feeling of relief quickly subsided as I handed the canteen back to Abdul, knowing we had to ration what little water we had. I felt my eyes burn as if I was on the brink of tears. I was far too old to be going on in such a childish manner and I knew I had to stay strong for the both of us, but I was tired of drought, tired of having so little, tired of never knowing when my next sip of water or bite of food would be. Abdul seemed to sense my sadness and reached out his hand to grasp mine. I stared at our grimy interlocked fingers, with sand

and dirt caked under our nails. His skin felt gravelly and rough. We had hardly enough water to drink, much less any to wash with. I squeezed his hand tight and prayed that tomorrow would be better.

June 19th, 2041

I stood on the hilltop with my daughter in arms, looking over the refugee camp's flourishing vegetable garden and straining my eyes to catch a glimpse of Abdul returning, just as I had years back. Yet this time, I knew there would be water. The Moroccan government built three prodigious desalination plants in Western Sahara, all of which were sustained by solar power. I looked proudly at my beautiful little girl and across the blooming community and I felt a wave of gratitude wash over me. I named my daughter Nahla, which means water in the desert. When she came, so did water. For the first time, I looked forward without fear of the future. [CS](#)



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ILLINOIS



2ND PLACE | Creative Writing Category |

Autumn Wieczorek

Autumn is 13 years old and from Aurora, IL. Her favorite classes are math and science and she enjoys reading, biking, hiking, and rock climbing. Autumn's favorite ways to enjoy water are swimming and drinking an ice-cold glass of water on a hot summer day!

AUTUMN'S ESSAY

"Maya come down for breakfast," I yelled to my young daughter who should've been heading to school soon.

"I'm coming mom!" She hurried down the stairs and I sat her down at the table with some fresh fruit and poured her a glass of water. A glass of water. It's music to my ears. I always remind Maya and myself how fortunate we are.

When I was growing up our town in Eritrea faced harsh water conditions. I would walk for hours to get freshwater and even when my family would finally get to water, it wasn't always as "fresh" as we needed. It was often extremely contaminated by human and animal waste. I would get sick all the time as a kid. Eritrea lacked 80.7% basic water services when I was growing up. So I keep Maya humble. It may be annoying, but I always say be grateful when I pour that glass.

"Be grateful for what you have because when I was little, I didn't!" And she gives me a frown. It is hard hearing about how I used to live. But she always ends up smiling and nodding and says she is very grateful for everything she has access to now.

It's 2041 now, but back in 2020 Eritrea had terrible deforestation and poor farming practices like plowing, that made water pollution and scarcity worse. Luckily, around 2021 Eritrea started to see improvements. Government and nongovernment organizations united to help get more water in Eritrea. It only got better from there. Officials and people in our community brought more attention

“Finding solutions to these problems was needed. It was worth it. Water is worth it!”



to the problems and we came together to make solutions. Farming habits were changed. Many farmers over-plowed their land, drying it out. It was hard to get any water from the ground. Now farmers take better care of the soil. Many protests ended deforestation, and we started to grow more trees. We are even growing our own tree and starting a garden in the backyard. The main solution to our problem was creating a system for our pipes to get water where it needed to be, without disrupting wildlife and human activity. They connect too many wells all over the country and travel to where

needed. When the water goes through the pipes and out a water source, all the contamination is filtered out.

We started harvesting rainwater and recycling wastewater. We improved irrigation and agriculture water use. We were able to improve our clean water supply within a couple years of starting this program for clean water. My daughter and I can shower and drink clean freshwater, whenever we need to. We have access to water within seconds when it used to be hours. Finding solutions to these problems was needed. It was worth it. Water is worth it! [CS](https://www.cswea.org)



1ST PLACE

 | Research Category |

Nolan Laflen,
River View Middle School, Kaukauna, WI

YEMEN'S WATER CRISIS

Yemen, which is the second-largest Arab sovereign state in the peninsula, is facing one of the most disastrous water crises in the world. This has been proven to be the result of the growing of qat, a drastic population increase, and the lack of governmental regulation on the usage of water. Because of such dramatic population growth, more and more Yemenis only get water once every nine days. Contaminated water is also a good reason why many Yemenis go thirsty or suffer from acute diarrhea; bad sanitation, and the overuse of pesticides and fertilizers are the main cause of polluted water in Yemen. However, UNICEF and its partners have been working very hard to get clean water to Yemen and its citizens. Through their efforts, they have been able to implement many clean water and sanitation stations for the citizens of Yemen. Thanks to their help in 2018, UNICEF was able to help over five million children and their families get clean water and get one million people emergency safe water.

Though many efforts have been made to transfer more clean and safe water to Yemen, I believe that there are many other innovations and creative techniques that could solve this same problem. One of these would be desalination. This is the process of taking out the mineral components in saline water and making it drinkable. 97% of Earth's water is saline so therefore we could take gallons of ocean water and desalinate it and then transfer that clean water to Yemen and other regions of the world going through a similar water crisis. In order for a lot of

“If these innovations were made and sent out to different struggling regions around the world, many people could have better lives; older adults wouldn't be at risk of diseases from contaminated water, children could get a better education instead of running to get water for their family.



water to be desalinated at one time, you would need a lot of boilers that could boil the water (which would leave the salt behind) and then you could collect this water by cooling the vapor down. Another innovation that could prove useful would be fog catchers. These machines would collect little water droplets and these droplets would flow into a gutter and through a filter so the water collected would be clean and safe to drink. I believe that these innovations should be implemented everywhere so there could be numerous clean water stations around the world.

If these innovations were made and sent out to different struggling regions

around the world, many people could have better lives; older adults wouldn't be at risk of diseases from contaminated water, children could get a better education instead of running to get water for their family, etc. I believe that there should be more companies dedicated to getting clean water for citizens of Yemen and other countries that are suffering and that we shouldn't take our plentiful supply of clean water for granted. In the future, I hope all citizens around the world, especially the Yemenis, have access to an abundant amount of safe, contamination-free water! **CS**



WISCONSIN

1ST
PLACE



1ST PLACE | Creative Writing Category |

Joseph S. Beal

Cherokee Heights Middle School, Madison WI

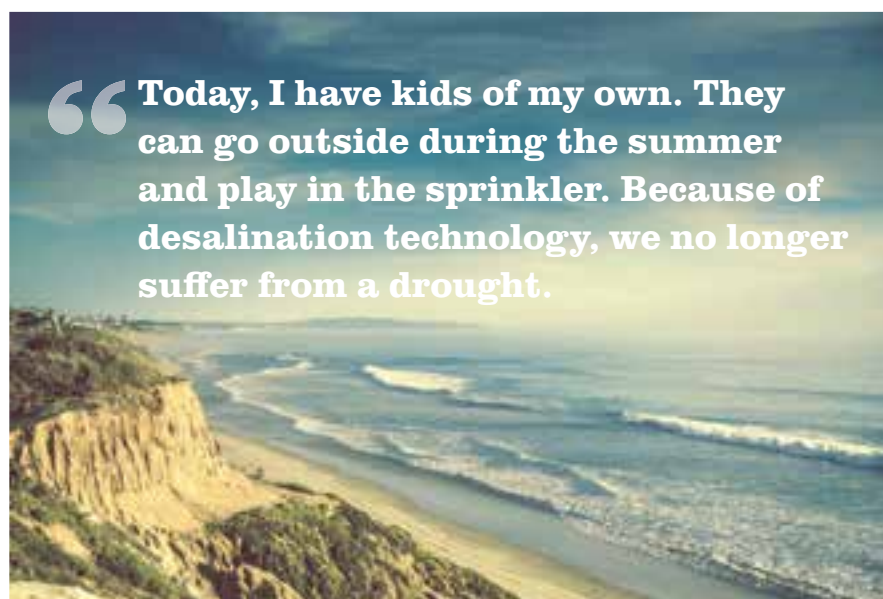
JOSEPH'S ESSAY

My name is Henry Elson, and I am a resident of San Diego, California. When I was 13 years old, I lived through a devastating drought that lasted 376 weeks. That's seven years and two months.

Shortly after the drought began, our governor imposed a limit to the amount of water each person could use in a day. We could use up to 21 gallons of water per person, per day. This meant that I could only take a shower for a few minutes before I would use up my daily water supply. I also had to be careful to turn off the water while brushing my teeth, and our garden died because we couldn't water it.

While all of this was happening, the residents of my city and the state's government were desperately trying to find ways to help us combat this drought. People tried to drill deeper wells but there wasn't enough equipment to do this for us. So we received bottled water, then we got refilling stations, and finally, once we did not have enough water for the refilling stations, the government gave us tanks full of clean water in our backyards and sent trucks every week to give us refills.

Sadly, this was not a permanent solution. Our government began to run out of money to keep offering regular refills to residents. Water became scarce, and the prices for bottled water started skyrocketing. At the same time, many lost their jobs as the drought destroyed fields of crops. My uncle worked on an almond farm, and the drought caused him to lose his job. It got harder to buy some kinds of food, and it was more expensive.



“Today, I have kids of my own. They can go outside during the summer and play in the sprinkler. Because of desalination technology, we no longer suffer from a drought.”

But then, after a long time, things started to change. The government began to invest more in desalination technology. Since we lived so close to the ocean, we could extract the drinkable water out of nearby seawater and then purify it to produce clean drinkable water! They started deploying solar-powered pods out into the ocean to collect seawater and distill it into drinkable water.


Soon after this, they took the desalination technology a step further. They began to build massive desalination plants on the shore, which would distill seawater at high rates. They would use a process called Reverse Osmosis in which seawater would be filtered through

a membrane to remove the salt and produce clean water!

Life started to get better. We no longer had to use plastic bottles that created waste, and we could take longer showers and water our gardens to grow our own food.

Today, I have kids of my own. They can go outside during the summer and play in the sprinkler. Because of desalination technology, we no longer suffer from a drought.

Desalination researched at USGS:
www.usgs.gov/special-topic/water-science-school/science/desalination?qt-science_center_objects=0#qt-science_center_objects CS



Vessel and her handler, Tim Preator, review the Recover leak maps before beginning their search.

Canines and Satellite Team Up to Find Leaking Water in Central Arkansas

BY PAUL GAGLIARDO, Gagliacqua

R

Rescue dogs are in the spotlight these days with Major, a German Shepherd rescue dog, the first dog from an animal shelter to reside in the White House. Another rescue dog named Vessel, in a shelter in Arkansas, was discovered to have the necessary skills to be trained as a Special Service Dog. At the same time, the CEO of Central

Arkansas Water (CAW) attended a water seminar in Oxford, England, and learned about a UK water utility using dogs to sniff out leaks from the potable water system. A CAW employee put him in touch with a local shelter trainer, and Vessel was selected as a Leak Detector Trainee and sent to training at *On the Nose* Leak Detection School outside Little Rock. Vessel is now a full-time member of the CAW leak detection team!

CAW uses ASTERRA's Utilis technology to pre-locate leaks in the water distribution system with the Recover product. Recover utilizes specialized radar signals from satellites to illuminate the area of interest and collect the resulting reflected signals. These signals are analyzed and processed to identify specific indicators of wet soil saturated with potable water. The result is a map showing Likely Leak Locations (LLs) or Points of Interest (POIs). These results typically encompass 5% of the entire system length. Only those locations where a leak is expected to be found are inspected. This is where Vessel comes in.

CAW started to inspect LLs identified with Recover leak detection in December 2017. The results are consistent with other Recover projects and much better than traditional boots-on-the-ground (TBOTG) methods, as shown in the table below. Recover's performance at CAW is a nine-times improvement over TBOTG in the number of leaks found per mile inspected and three times better on the leaks-per-day metric.

Dogs possess a sense of smell many times more sensitive than even the most advanced man-made instrument. The leak detection team, Vessel and her handler, Tim Preator, are sent out to areas identified by Recover to search for leaks. Vessel is put to work using the command "Find Leak," making a broad sweep of the LLL, and then she pinpoints the leak. She shows a passive alert, lying down and barking when she finds a leak. She is rewarded for her efforts with tennis ball play.

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LEAK DETECTION PERFORMANCE AT CENTRAL ARKANSAS WATER

| | LEAKS PER MILE | LEAKS PER DAY |
|--------------------------------|----------------|---------------|
| Recover North American Average | 2.8 | 3.6 |
| TBOTG North American Average | 0.3 | 1.2 |
| CAW Results with Recover | 2.8 | 3.3 |

Vessel has been working in the field since October 2019, and she is more than 90% accurate in detecting leaks. The CAW staff performs conventional acoustic correlation using pinpointing tools to more precisely locate the leak so that crews can dig and repair the pipe. This reduces the number of leaks found per day in the field as Vessel's indications are confirmed with human validation. But as confidence in the efficacy of Vessel's pinpointing ability and the ability of the handler to accurately read her body language continues to grow, the number of leaks pinpointed per day will rise, and overall efficiency will improve. In one case, Vessel found a non-surfacing leak that was between a six-inch valve and the tapping saddle off of a 12-inch cast-iron main under a concrete parking lot. The lot is built over a gravel base, allowing the water to flow directly into a storm drain. This leak alone was costing CAW 2.3 MGD.

Leak detection has evolved from old school divining rods and listening sticks to space-age satellites and now back to basics, using the innate capabilities found in nature. Check out ASTERRA at <https://asterra.io> or email inquiry@asterra.io to bring Recover leak detection and analysis to your community. ●

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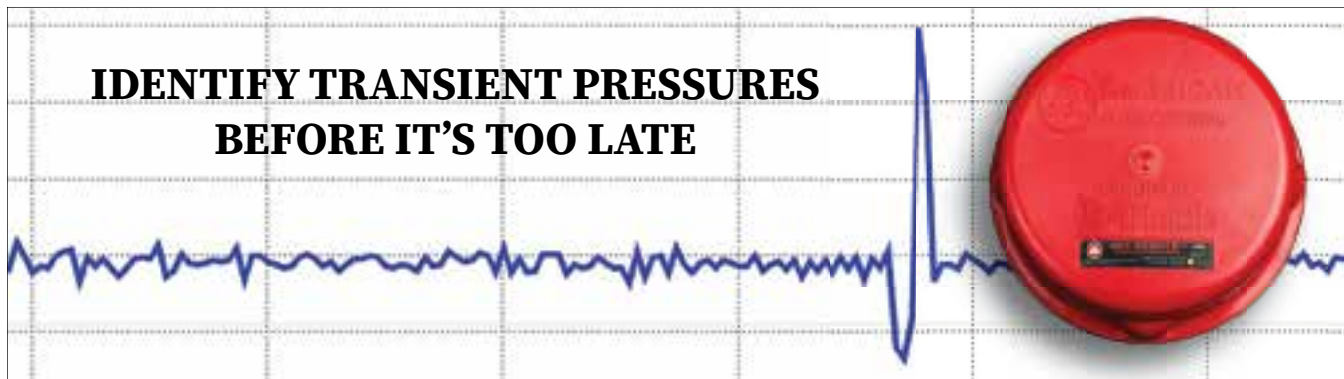


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Congratulations Minnesota's Bongards' Creameries – WEF 2021 Industrial Water Quality Achievement Award

The following is a letter from the Water Environment Federation to Bongards' Creameries, announcing a notable achievement, sent June 29, 2021.

Dear Bongards' Creameries,

It is my privilege and pleasure to notify you that Bongards' Creameries has been selected by the Water Environment Federation as the 2021 recipient of the **Industrial Water Quality Achievement Award**!

We are excited to announce that WEFTEC will be held in Chicago, Illinois on October 16-20! The WEF Awards Celebration/Presidential Ceremony details are below:

WEF Awards Celebration Presidential Ceremony

Tuesday, October 19, 2021

4:30 pm-5:30 pm CST

WEF Awards Celebration Presidential Ceremony Reception

Tuesday, October 19, 2021

5:30 pm-6:00 pm CST

We hope you will join us in celebrating this outstanding achievement. WEFTEC registration and housing is now open at www.weftec.org. Information regarding the ceremony location and practice rehearsal will be sent in the upcoming weeks.

We congratulate you on this prestigious recognition!

Sincerely,

Walter T. Marlowe, P.E., CAE
Executive Director
Water Environment Federation

Bongards' Creameries is a farmer-owned co-op with over a century of cheese-making expertise. Established in 1908, Bongards' is headquartered in Chanhassen, MN and has retail locations in both Bongards and Perham, MN. The company prides itself in being a trusted cheese supplier to service segments ranging from K-12 schools, to restaurants, to grocery stores. CS



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| Business Name (if applicable) | | | | | |
| Street or P.O. Box <input type="checkbox"/> Business Address <input type="checkbox"/> Home Address | | | | | |
| City | | State | | Zip | Country |
| Home Phone Number | | Mobile Number | | Business Phone Number | |
| E-mail Address to receive WEF Highlights Online | | | | Date of Birth (mm/yyyy): | |
| <input type="checkbox"/> Please send me information on special offers, discounts, training and educational events, and new product information to enhance my career. | | | | | |

Demographic Information

The following is requested for informational purposes only. Gender: ☐ Female ☐ Male

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