Aerial view of Appleton Wastewater Treatment Plant, Appleton, WI

55th Annual W.W.O.A. Conference
October 5-8, 2021
La Crosse Convention Center, La Crosse
The Clarifier is the publication of the Wisconsin Wastewater Operators’ Association and is intended to inform and educate the membership on issues related to the treatment and control of wastewater. The Clarifier is produced five (5) times each year: February, April, June, September, and December. All members are encouraged to contribute to the mission of the Clarifier.

The Wisconsin Wastewater Operators’ Association is a non-profit organization dedicated to educating, informing, and advancing the wastewater profession. WWOA has approximately 2,000 members divided throughout six regions: Southeast, Southern, Lake Michigan, North Central, Northwest, and West Central.
Presidents message: Spring is in the air!

As I write this it looks like spring is just around the corner. The snow is almost gone, the fruit trees in my small orchard are pruned, and on the warmer sunny days the honey bees are coming out and starting to explore. Although I don’t believe that they will find much to take back to the hives, at least until the dandelions bloom. I always enjoy seeing the dandelions, not only are they pretty but it signals that I no longer need to worry so much about feeding the bees to help them through the winter.

Those of you that have contacted our executive secretary recently may have noticed that Nancy Short is no longer affiliated with us. The Executive Committee of the WWOA Board which consists of Past President Jeff Smudde, myself, President-elect Rick Mealy, and Vice President Jeremy Cramer have occasional conversations with Association Executives Group (AEG) management to discuss their involvement with WWOA operations.

It was during one of these meetings AEG offered that they had a promising junior employee that they were looking to promote, and thought that she would be a good fit for WWOA. The entire Board met Courtney Harris via Zoom meeting and agreed to have her as our executive secretary. If you have any communication with Courtney please welcome her aboard. I want to thank Nancy for all of her efforts for us in the past and for helping Courtney during the transition.

Just like all of you it’s time for me to ‘get back at it’ and continue getting ready for warmer weather and all of the projects that come with it. Keep doing the things that you do to protect the waters of Wisconsin so that we can enjoy them all year long.

Take Care Everyone
Don Lintner

The Government Affairs Seminar and Spring Biosolids Symposium were held virtually. Many thanks to all involved for their efforts in putting on these very successful programs, they each had over 200 registered attendees.

Looking ahead, planning continues for the Annual Conference. Technical sessions have been selected and placed in the program. As we have done for the past couple of years, there will be four tracks of sessions with plenty of time allowed to visit the vendors in the exhibit hall.

Do you have something to say?
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Won recognition for a job well done?
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Jon Butt, Clarifier Editor
c/o Symbiont, 6737 W. Washington St., Suite 3440
Milwaukee, WI 53214
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Office: 414-291-8840
City of Appleton Wastewater Treatment Plant history

Appleton first built a combined sanitary and storm sewer system in 1883. Sewage and stormwater were conveyed out of the city and into the Fox River.

By the early 1930s, as more people moved into the city and more industries were developing, the community and government became more aware and concerned about the quality of the Fox River. During this period, the Fox River had become so polluted that it was unable to sustain the habitat of its native fish and wildlife species. Outbreaks of cholera and dysentery made it apparent that the city needed to provide a means of treating the city's wastewater. This awareness led the 1937 design and construction of the Appleton Sewerage Treatment Plant and Interceptor Sewer System. This plant provided primary treatment which meant that the wastewater was only partially treated and absorbed by the river.

In the 1960s water quality surveys began to show the extent to which our natural waters were polluted. Appleton met the challenge in combating this problem with the expansion of the treatment facilities in the mid-1960s to include secondary treatment. The secondary treatment process enabled the city to treat its wastewater more effectively while simultaneously ensuring that this treatment resulted in a lower contaminant discharge to the river.

In the 1970s the Appleton Wastewater Treatment Plant (AWWTP) again began planning for necessary improvements to meet the requirements of the Federal Water Pollution Control Act Amendment of 1972 that stated, “discharge of pollutants into the navigable water (which include all-natural streams and lakes) be eliminated by 1985”. During this same period, concerns for the Great...
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Lakes and its tributaries led to the signing international agreements between the United States and Canada to enact clean water legislation as well as to promote the preservation of these resources.

Major construction of the most recent phase of treatment expansion improvements at the AWWTP began in 1990 and were completed in 1994. Since 1994, most treatment process equipment has been changed out with newer, more efficient, replacements. Within the past two years, plant staff have recently finished upgrades to WAS sludge pumping,
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methane gas equipment, aeration turbine blowers, and a high efficiency methane boiler. Projects under construction include replacements to 12 RAS pumps, digester heat exchanger, and pipe replacements throughout the plant. For 2022 construction the plant will increase sludge storage by 50% and replace the BFP dewatering equipment.

The following is a current description of the treatment processes employed at the Appleton Wastewater Treatment Plant (AWWTP).

Screening - Raw Sewage (RS) flows through either a single or combination of fine mechanically cleaned screens where coarse solids are removed. Prior to disposal, screenings are washed and compressed.

Grit Removal - Coarse inorganic material is removed in the two conical vortex basins. The grit is then further dewatered via grit classifiers. After liming the materials, both grit and screenings are transported to the county landfill.

Primary Clarification - The six primary clarifiers allow removal of a portion of the settleable solids and with this material about 30% of BOD5 and 60% of the TSS are removed. Settled solids are pumped to the anaerobic digesters as raw primary sludge. Primary effluent (PE) which leaves the tanks is flow split into three aeration tanks for biological treatment.

Aeration Tanks - In the three aeration tanks, the PE is mixed with return activated sludge (RAS) to form mixed liquor (ML). Within the aerated ML an active mass of microorganisms is produced and sustained which stabilizes...
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organic material. This mass of organisms flows out of the aeration tanks and into the final clarifiers.

Nutrient Removal - Phosphorus and Ammonia levels are reduced throughout the treatment processes. Phosphorus is first reduced through biological treatment as a necessary nutrient for microorganisms. Remaining phosphorus is chemically with ferric chloride and ferrous sulfate. Ammonia is removed concurrently with the activated sludge process. The process, single stage nitrification, is dependent on oxygen, temperature, and higher sludge ages in the winter.

Final Clarifiers - Six center feed clarifiers are provided to remove the flocculent suspension of activated sludge from the ML leaving the aeration tanks. Settled solids from the clarifiers are returned to the aeration tanks as return activated sludge (RAS) or wasted (WAS) to the floatation thickeners then to the anaerobic digesters. The clarified

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wastewater which leaves the final clarifiers flows to the Chlorine Contact Basins as final effluent.

**Chlorination/Dechlorination** - Prior to entering the chlorine contact tank, final effluent is seasonally chlorinated to reduce the number of pathogenic and indicator (faecal coliform) organisms. The chlorine contact tanks provide hydraulic residence time to enable the chlorine solution to accomplish disinfection. Chlorine can also be added to the plant influent for odor control (prechlorination) and to the return activated sludge lines to control sludge bulking (RAS chlorination). Dechlorination takes place at the end of the second chlorine contact tank. Sodium bisulfite solution is added to this point to remove chlorine compounds which could be detrimental to aquatic life in the receiving stream.

**Anaerobic Digestion and Storage** - The anaerobic digesters receive sludge from various plant facilities. The digesters stabilize the sludge by decomposing the organics, reducing the mass and volume of the sludges by converting organic matter to stabilized organics, water, methane, and CO2 gas. Methane created is utilized to heat the two anaerobic digesters to 95 degrees Fahrenheit and heat 17 of the buildings on site. Destruction of pathogenic organisms occurs here in the absence of oxygen.

**Solids Processing** - Several sludge sources are combined from processes throughout the plant. Activated sludge which has been removed (“wasted”) from the treatment process is sent to dissolved air flotation thickeners (DAF) for sludge thickening and then to the anaerobic digesters. Primary sludge and scum from primary treatment is also sent to the digesters. The plant also has a hauled waste program that accepts predominantly food and cheese wastes. Sludges are digested for 15 – 30 days. Post digested sludge is stored in secondary sludge tanks prior to dewatering. Dewatering occurs over three, 2-meter belt filter presses. Filtrate from dewatering is flow equalized and then fed as a side stream into the activated sludge process.

**Sludge Storage** - The sludge storage building receives dewatered sludge from the belt presses. The sludge can then be stored during wet weather or the winter months prior to ultimate disposal.

**Composting** - The AWWTP utilizes biosolids along with city collected leaf and brush from Appleton residents to create biosolids compost. The process occurs outdoors on a six-acre site east of the City. Once the materials are fully composted, they are distributed to residents free of charge. Excess compost is sold or used for special projects.

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### Appleton Wastewater Treatment Plant
#### Design and Operating Data

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| Population | 75,000 |
| Sanitary Sewers | 375 miles |

#### Capacities of the plant

| Design flow rate | 15.5 MGD |
| Average flow rate | 13.4 MGD |
| Maximum flow rate | 102 MGD |

*continued on page 14*
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Operating permit data
Maximum daily CBOD discharge 25 mg/L
Maximum daily SS discharge 30 mg/L and 1,322 lbs/day
Ammonia Concentration 4.4 – 18 mg/L (varying seasonally)
Maximum phosphorous, mass limit 23 lbs/day (2022 TMDL)
pH range 6.0 – 9.0 standard units
Maximum chlorine residual 0.038 mg/L
Seasonal wasteload allocations for the Fox River Reference NR 212

Operations and Maintenance Staff
The AWWTP has an exceptionally credentialed and experienced staff. Their teamwork allows for the plant to have an excellent regulatory compliance record (e.g., DMR, CMAR, etc.). The plant operations and maintenance are overseen by Operations Supervisor Ryan Rice. The plant relies on 4 liquids operators, 2 solids operators, and 4 utility workers. Maintenance staff include 2 mechanics, 1 instrument technician. Some staff have half time responsibilities with the department including 1 purchasing specialist and 1 master electrician. The plant laboratory is staffed by two laboratory technicians and overseen by Technical Services Manager Michael Suha. The laboratory is responsible for compliance and process testing, Pretreatment Program sampling, Mercury Program, and other special project requirements. The Biosolids and Pretreatment Programs are managed by Environmental Programs Coordinator Brian Kreski. Administrative business is performed by Administrative Assistant Kristy Veldman. Utilities Director Chris Shaw and Deputy Director Chris Stempa are responsible for managing the Appleton Water and Wastewater Utilities.

In 1999, we were honored to be awarded the Environmental Protection Agency's National Award for "Outstanding Wastewater Treatment Facility Operations and Maintenance" Our community and staff have continued to strive for excellence in providing top quality wastewater treatment through its operations and maintenance for our citizens and our environment! 🌐
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2021 Government Affairs seminar summary
Prepared By: WWOA (Jeff Smudde, Jenny Pagel, Ben Brooks)

The 2021 Government Affairs Seminar was held virtually and brought two days of information and education to 249 professionals associated with the wastewater industry. The seminar provided an opportunity for attendees to obtain the most recent information regarding regulatory initiatives in Wisconsin and USEPA Region 5, and to learn how Wisconsin dischargers are managing their operations within this evolving regulatory environment.

On February 17 and 18, 2021 the Government Affairs Seminar welcomed attendees representing a wide spectrum of interests, including those involved with municipal government, state and federal regulation, education, advocacy, consulting, legal, and industry.

Day one began with keynote speaker, and DNR Deputy Secretary, Todd Ambs, who provided an overview of upcoming initiatives and current challenges facing the DNR. The first session was titled Back to Basics. Wade Strickland, DNR, presented the basics of permitting in WI, and Jay Kemp, Black and Veatch, presented about how facilities are classified. This was followed by Vanessa Wishart, MEG Wastewater, discussing how laws and regulations are put into action and Nicole Kruschel, MSA Professional Services, presenting about funding options for WWTPs.

Upcoming issues were the focus of session two on the first day. Paul Kent, MEG Wastewater, shared the most current information about Per and Polyfluoroalkyl Substances (PFAS).

Chlorides were the next topic, with a panel of presenters. Steve Corsi, USGS, presented about chloride impacts to groundwater, Lila Johnson, Baxter and Woodman, presented a case study about Paddock Lake’s experiences with chloride reduction, and Allison Madison, WI Salt Wise, shared information about the resources Salt Wise can provide for chloride reduction needs.

The last two sessions on day one included a presentation by Emily Jones, Madison MSD about dental amalgam program reporting and by Paul Swaim, Jacobs Engineering, about the impacts of complying with E-coli after decades of fecal coliform.

Day two of the event began with Jerry Deschane, WI League of Municipalities, providing an update on new legislative activities, an outlook for the new administration, and upcoming issues. The first session addressed social issues. The first issue of focus was COVID 19. A panel of presenters included Jake Becken, NEW Water, who provided an update on the impacts of COVID 19 on facilities and the power of virtual roundtables, Amy Garbe, DNR, who discussed the impacts of COVID 19 on DNR and EPA, then Martin Shafer, WI State Laboratory of Hygiene, discussed wastewater surveillance for SARS-CoV-2 and the lessons learned from a statewide monitoring effort in Wisconsin.

The other social issue addressed was diversity, equity, and inclusion. Bri Nakamura, WEF-INFLOW gave an inspiring presentation about bringing diversity, equity, and inclusion to the water sector.

The second session on day two addressed regulatory compliance strategies. A diverse panel included Matt Claucherty, DNR, presenting about the state of phosphorus continued on page 17
The final session on day two included regulatory updates from several WDNR staff members. Meghan Williams and Kristi Minahan shared information about the triennial standards review and Jason Knutson and Adrian Stocks provided additional DNR updates and also presented the annual awards.

Mr. Knutson announced the winners of the 2021 WDNR Wastewater Operator Awards. Glen Franzen, Village of Crivitz, and Tyler Fadness, City of Eau Claire received recognition as “Outstanding Operator”, and the Spencer Wastewater Treatment Facility and Boscobel Wastewater Treatment Facility were recognized for “Outstanding Plant Performance”. Congratulations to all that were nominated!

Planning efforts for the 2022 Government Affairs Seminar are already underway! The seminar will return to Fond du Lac in 2022 for its second year at the new location. Mark your calendars for Thursday February 17, 2022 at the Radisson in Fond du Lac.

Remaining Clarifier Deadlines

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Recognize a deserving individual for 2021!

Recognition is something that shows someone the value of their contributions and inspires them and others to continue to work harder at their jobs. So many people in this organization work so hard to help others, without expectation of any recognition.

Yet, being recognized is an overwhelming experience as the individual(s) come(s) to realize that their efforts have been noticed by their peers. Receiving an award in front of one’s peers at the annual awards banquet is both a humbling and pinnacle moment for recipients. Especially as we begin to crawl out from under the many months of pandemic-related isolation, it is even more important to recognize those individuals that go above and beyond for the good of our organization.

It’s often hard to determine who exactly deserves one of the WWOA awards because so many individuals are deserving. I encourage you to take a look at the lists of past winners of these awards (WWOA Annual Awards page), and then consider individuals that meet the award criteria that have yet to be recognized.

Please, please, PLEASE…nominate someone today for the annual conference awards. It is time to start filling out the nomination papers for the Annual Conference Awards. There are many people in our industry that are deserving of these awards.

We are looking for nominees for the following awards:

ASSOCIATION AWARDS (Note: WWOA Board members are not eligible for these awards)

George F. Bernauer Award:
Criteria include successful plant performance, and/or successful solution of important or complicated operational problems, and/or outstanding contributions in the field of wastewater technology in the State of Wisconsin. The nominee may be a municipal, industrial, or institutional operator, administrator, or educator in Wisconsin. It is not limited to WWOA members.

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**Koby Crabtree Award:**
Presented to a WWOA member for excellence in technical support provided to others in the field of wastewater treatment. The individual should be a recognized authority in some aspect of wastewater, share knowledge through presentation, contribute to problem solving, and provide service regardless of compensation.

**Albers-Templeton Service Award:**
Presented to a person who has made an outstanding contribution to the WWOA in the areas of promotion, operation, management, program participation, or education. The nominee must be an active member of WWOA for a period of ten years.

**Newcomer of the Year Award:**
Recognizes an operator, support staffer, or environmental technician with less than three years of experience as of August 1st of the year nominated. The nominee should demonstrate higher than average growth in their place of employment, a willingness to learn, innovation on the job, and exceptional enthusiasm for their profession. The nominator should be a supervisor, manager, peer, co-worker, or DNR personnel familiar with the day-to-day efforts of the nominee. WWOA membership is not required, and a two-year membership or renewal is included in the award.

**Membership Award:**
Presented to the WWOA member who sponsors the most new WWOA memberships.

**REGIONAL AWARDS**

**Regional Operator of the Year Awards:**
Given out to someone who has demonstrated excellent plant performance, and/or successful solution to a problem, and/or contributions to the wastewater field. It is open to Wisconsin Certified operators of municipal, industrial, or institutional wastewater treatment facilities. This award is not just limited to actual plant operators, but is open to those working in a variety of areas, including biosolids, collections, engineering, lab operations, maintenance, etc. The nominee must be at least a five year member of WWOA.

The nomination form and instructions for all the awards can be found on the WWOA website or by contacting Rick Mealy, Awards Committee Chair, at (608) 220-9457 or email at awards@wwoa.org.

Please note, the Regional Operator of the Year Award nominations should be submitted to the Regional officers listed on the nomination form by July 24, 2021.

All other awards need to be submitted by August 1, 2021 for consideration. Feel free to contact me if you would like any further information on the awards, the nomination procedure, or if you have a question if a potential nominee meets specific award criteria.

Thank you in advance for taking the time and effort to nominate individuals and allowing WWOA to recognize these deserving recipients! 😊

Sincerely,
Rick Mealy, Awards Committee Chair
The Village of Spencer WWTP has struggled with a midge fly problem for almost 30 years. We are fortunate to have our secondary clarifiers located inside a brick building as this provides great freeze protection in the winter and algae protection in the summer. Unfortunately, it also creates the perfect breeding habitat for the midges. By the middle of the summer, the swarms would be so thick that our staff didn’t even like to go into the room to take sludge blanket measurements. Picking midge flies out of your clothing, hair, ears, and nose, isn’t a great way to start your day. And because our clarifier room is connected to the rest of our service building, the midges got in there too. The swarms would get into every light fixture, electrical control panel, and junction box. And with them came the spiders!

In the beginning we would hang automatic dispensers with spray cans of insecticide, similar to household air fresheners, around the building to knock down the swarms, but this was little more than a temporary fix. The midge fly has a 10-day breeding cycle so trying to control the adult population can be an exercise in futility, as there is always another hatch on the way. And because we’ve had problems with Whole Effluent Toxicity test failures in the past, including numerous retests, toxicity reduction evaluations and extensive collection system sampling activities, we were always hesitant to use large doses of traditional insecticides like the methoprene often marketed to wastewater plants to control midges and filter flies.

With agricultural backgrounds, our staff was familiar with more natural forms of insect control like bacillus thuringiensis, a naturally occurring bacterium common in many soils. This bacterium produces a protein that disrupts the biology of some insects. Some corn hybrids have been modified to produce the same protein to protect them against insect predation. In the early 2000s many products hit the market using Bt to control mosquito populations. Because of their similar biology to mosquitoes, we tried many of these products to control our midge flies, including a number of products eventually designed and marketed to WWTPs for midge and filter fly control. Our success with these products however was limited.

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While Bt products can definitely work, proper application can be challenging. Despite using a combination of liquid and granular formulations, we struggled getting the Bt product into all of the nooks and crannies of our system. The red worms that are the larval form of the midge fly burrow into clarifier sludge blankets and other areas with poor mixing, especially concerning for us during the low flow periods of summer. Also, proper dosages mean matching application rates with daily influent flows, another challenge for us due to highly variable hauled-in-waste volumes. In a given year we would spend up to $5000 on Bt applications and never achieved adequate control. We estimated complete control would have cost us 2 to 3 times as much, a price we were never quite willing to pay.

Our most successful chemical product was a barrier oil call Agnique MMF. This product could be applied in very small dosages to the surface of the clarifiers, creating a “monomolecular film” that disrupted the surface tension of the water, preventing the midge fly pupae from extending its breathing tube through the surface, effectively suffocating it. The lack of surface tension also made it impossible for adults to climb out of the water or stand on the surface.

Using this product, we were able to achieve up to 75% control. Our biggest limitation here was our inability to cover the entire surface of the clarifiers with the oil due to their unique “Squircle” design; square tanks with round scum baffles created corners where the oil would wash out over the weirs almost immediately.

Unfortunately, Agnique MMF was taken off the market and we weren’t able to buy the product after 2013. We switched back to the Bt products and had the same issues with dosage, application, and cost. We put up with limited control for many more years until hearing about a program in Florida that was using excess tankage at their WWTP to breed minnows used to control mosquitoes in their urban storm water system.

The staff at Spencer had joked about using fish to control our midge fly problem for years. Often throughout the year staff would store bait minnows from one weekend to the next in our clarifiers to increase the chances they would survive the week until the next fishing trip. They would joke about bringing fish back from a trip and tossing them into the clarifiers. And we heard of at least one WWTP that stocked an aquarium with fish using treated effluent as a demonstration of the success of their treatment process.

When we heard about minnows being used to control mosquitoes, we were excited to give it a try.

Our first call was to our local DNR fisheries biologist. Our greatest concerns were avoiding potential invasive species issues and determining if we needed to have a fish stocking permit. A quick web search identified many species of minnows used to control mosquitoes around the United States, even one commonly called the mosquito minnow, but many of these are identified by the Wisconsin DNR as invasive. The fisheries biologist was able to identify a number of minnow species found in the stream surveys done in our area, as well as the ones most tolerant of the less than ideal water quality conditions that might be found in a treatment plant. Our eventual pick was the common fathead minnow.

After being reassured that no special permit or license was needed to cover our activities, the fisheries biologist referred us to Gollon Brothers Wholesale Live Bait out of Stevens Point. With over 80 years in the industry, and a regular delivery route that brough them through Spencer every week, Gollon Brother’s was the perfect fit for our needs. They had three of the species recommended by the fisheries biologist, including the fathead, and certified their fish as disease, invasive, and exotic free.

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The fisheries biologist suggested that we might need up to 10% of the midge fly mass, in minnows, to reach a level of control. Without a reliable way to measure that mass we had an initial thought to start with 12 dozen minnows per tank before being set straight by Gollon Bothers. Wholesalers don’t sell minnows by the dozen, but rather the gallon, with counts per gallon dependent on minnow size. Gollon Brothers required a minimum purchase of 1/2 gallon, or about 500 two-inch long fatheads, so we started with 500 minnows per clarifier.

Because the tanks don’t have the necessary breeding habitat, we knew that we would need to restock the minnows due to attrition over time. It was not uncommon to see minnows washed out over the weirs, swimming around in the UV disinfection channel, and even floating in the oxidation ditch. When we took apart an RAS pump for maintenance, we even found a bunch stuck in the check valve. But aside from the grief caused by seeing them on occasion, dead minnows were never an issue.

Despite this lack of breeding habitat, we did see some evidence of reproduction. On several occasions during the summer, we would spot schools of small fry, maybe 1/8 to 1/4 inch long, swimming near the surface. When they made their way over to the weirs, they were quickly washed out due to the flow of water. But seeing them proved that at least some small amount of reproduction was possible. We would also often see what we assumed were female minnows swollen larger with eggs. We have thought of adding cribbing or other breeding habitat to the tanks to try and become self-sufficient, but the minimal cost of new minnows, and the ability to better target application rates by adding what we need, makes stocking an easy solution.

We made our first minnow application in April, ahead of the midge fly season, in hopes of getting control early. We varied the rates between 500 and 1000 minnows per tank per application, with applications made between one and three weeks. Eventually we settled on 1000 minnows added to each tank every two weeks. This interval fit in well with Gollon Brother’s delivery schedule and we continued applications through the first week in October. This resulted in near 100% control of the midge fly population. A complete success!

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We made attempts to track minnow populations each day by documenting the numbers of minnows we observed during regular inspections. But despite relatively low turbidity, it was hard to see more than 5 feet under the surface. With 40-foot square tanks, 12 feet deep, we found that even 1000 minnows quickly dispersed throughout the tank volume such that it was uncommon to see more than a few at the surface at a time.

The only major accommodation we made for the minnows was to ensure we had adequate dissolved oxygen levels in the clarifiers. This was never an issue as we almost always had a high surplus of D.O. coming out of our oxidation ditch, sometimes as high as 8 mg/l, well above the 4 mg/l in our permit, the same amount recommended to support the fish.

We have an effluent reaeration system that we can use in an emergency and planned on modifying that to supply air to the clarifiers, but it was never needed. Last fall we upgraded our oxidation ditch aeration system to run on VFD’s controlled by D.O. probes, which will allow us to supply just the right amount of air at a reduced cost.

Using pervious methods, it was common for us to lose complete control of the midge population in the late summer. By carrying out minnow stocking into the fall, we hope that the overwintering population of midge fly larvae will be very small. This may allow us to start this year’s application later, maybe into May. While we expect they will return eventually, using the minnows is likely to guarantee that we never have another major midge fly breakout again.

As good as complete control is, it is made even better when the cost of using the minnows is compared to previous methods. At around $50 per gallon, we spent $1200 on minnow stocking in 2020, a fraction of what it cost us in previous years to achieve some level of inadequate control using the Bt larvicides and Agnique barrier oil.

And there is the added level of satisfaction knowing that we are creating a high-quality effluent that can support the fathead minnow population. They will definitely add a unique opportunity for discussion once plant tours are resumed again.

For pictures and videos of the midges, red worms, and minnows, follow this link to a shared OneDrive folder, https://onedrive.live.com/?id=704A18F9AEA3FD26%21106&cid=704A18F9AEA3FD26.
Laboratory Limelight: DNR sampling WWTP effluents for PFAS – So many questions!

By Rick Mealy, RGM Lab Consulting

This is not intended as an indictment of PFAS activity by the state of Wisconsin. Neither is it a pro-PFAS position statement. The intent of this article is simply to ask relevant questions about PFAS sampling being conducted at wastewater treatment facilities. PFAS may eventually prove to be a major health concern, but we need to keep in mind that a similar assault on “BPA” plastic occurred over 10 years ago, and after 10 years of study, it was determined that BPA could not be causally linked to any health risks.

PFAS compounds have been around for over 60 years, therefore it seems reasonable that attempts to regulate these compounds proceed cautiously, and any investigations be performed with a goal to obtain quality data.

The facts are that there are currently no conclusive studies providing direct causal evidence that PFAS chemicals pose serious health issues. Are there some studies showing possible links? Absolutely. The strongest argument can be made that there appears to be a link between elevated PFAS and elevated cholesterol. But, as a nation of obesity, and a state that loves its fried foods, can we state with certainty that elevated cholesterol is caused by PFAS from a non-stick frying pan? Or, is it due to the frequency at which we fry our foods in oils and butter in that same pan?

Last year, about 150 municipalities were asked to voluntarily submit samples to the DNR for PFAS testing; only a select few facilities complied. Earlier this year, 150 municipal wastewater facilities, largely those contacted last year, were informed that the DNR would be coming to sample their effluent for PFAS. This was not a request, mind you, but a statement, purportedly bolstered by reference to Statutes [283.55(2)(a)] and Administrative Rule [NR 205.07(1)(d)]. Facilities received a letter and then a follow-up email to schedule a date for someone to come out and collect the sample. And that’s where the story begins.

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Full disclosure: I worked for the DNR for 26 years. I was proud of what I accomplished and felt that I always operated openly and properly. But I also was aware that on at least some occasions, some agency staff operated a bit disingenuously, citing rules as authority to do something, when it could be easily argued that the cited rules really did not provide the authority that was declared. That is disturbing. Was it done intentionally? I’d like to believe that was not the case. In my experience, proceeding with incorrectly perceived authority usually stemmed from taking a small piece of administrative rule out of context.

On the issue of PFAS, the primary concern is that PFAS are not regulated in Wisconsin…period. Yes, proposed regulations are underway, but that can be a very long road to travel with no guarantee of promulgation, especially given the partisan divide between the state legislature and the Governor’s office. There are a number of other concerns regarding the sampling taking place. How individual facilities respond to the announced sampling is up to them, but in the interest of good science and rule authority, the following questions need to be considered.

1. Does the DNR have authority to come in and sample WWTP effluent for PFAS?
The cited reference of importance is NR205.07(1)(d), which states:

   (d) The permittee shall allow an authorized representative of the department, upon the presentation of credentials, to: …

4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance, any substances or parameters at any location.

I would suggest that the DNR is leaning heavily upon the language, “any substances or parameters”, but the armchair lawyer in me would argue that this is taken out of context. The language before that, “for the purposes of assuring permit compliance” really tells the story. The intent here is clearly that if the DNR believes a facility is falsely reporting their effluent results for permit compliance, then they have the right to independently sample a facility’s effluent. But permit compliance hangs ominously overhead like the Sword of Damocles. If your facility is permitted for BOD, TSS, and Phosphorus, certainly, the DNR has authority to come in and take samples for these parameters, but no more. PFAS, however, is not yet regulated in the state and therefore it does not exist in permits. Subsequently, a strong argument exists that the DNR is overstepping its authority. What if a facility refuses to allow the DNR to collect a sample for PFAS? Will that facility face enforcement action? I wonder how an appeal and a request for a hearing before an administrative law judge would go?

2. What method is being used to test for PFAS in wastewater?
The only approved method is for drinking water, EPA Method 537.1, and the only approved lab in the state is the Wisconsin State Lab of Hygiene, which serves as a partner with the DNR to provide testing. It is simply not appropriate to use a method designed for drinking water to test wastewater. Because of this fact, there is question about the DNR’s ability to make inferences based on the data it collects. I inquired around about the rationale for using the State Lab of Hygiene and was told that the DNR “has no money for testing”. This alludes to the use of what is internally known as the “Basic Agreement”. In each biennial budget, the Legislature approves a certain amount of funding that can be used to purchase testing at the State Lab of Hygiene. This is apparently how the testing is being funded. But in the end, if the data generated are used to establish causal relationships or make regulatory decisions, it would seem that using a drinking water method on wastewater samples should raise questions about the data.
3. Why isn’t the influent being sampled?
Given that the DNR acknowledges that WWTPs are not creating PFAS, but instead serve as a flow-through system, wouldn’t it make more sense to sample the influent to determine the full extent of PFAS levels coming into the system? The one answer I received raised the theory that PFAS simply travel through the system, and therefore sampling effluent was appropriate. That theory smells funny, and I’m not eating it. PFAS are heavy molecules, and would be expected to largely settle out in the biosolids. It is understandable that the DNR is looking to determine effects of effluent PFAS levels on downstream water quality, but again, the quality of the data based on methods employed and how samples are collected will taint any conclusions drawn.

More to the point, the drinking water method approved for PFAS employs a solid-phase extraction (SPE) protocol, where the water sample is filtered through a filter disk which has an affinity for the analytes of interest. The target analytes (here, PFAS) are chemically held onto the disk, and then eluted (washed) off of the filter using an appropriate solvent. Influent samples would not be appropriate because of the high level of solids present in this sample matrix. Any PFAS in the solids portion would not be captured by the filter disk. Thus, while the influent seems the more logical choice to sample, the drinking water method used for analysis is not appropriate for these samples.

4. Are proper sampling techniques being followed?
We know that PFAS are known as the “forever” chemicals and that they are ubiquitous. Therefore, special attention to sample collection protocol is required to ensure samples are not contaminated by background PFAS levels. PFAS-free containers and collection equipment should be used. And, if one pays strict attention to the analytical method, staff involved in sampling for PFAS have to pay close attention to the clothes they wear, and the meals they have eaten. For example, someone that is wearing Gore-Tex, and happened to eat several fast-food sandwiches and fries at lunch, may actually contaminate samples with PFAS. And if a “Sharpie” is used to document sampling details, that could also contribute to contamination. These are but a few of the sampling issues to consider.

Reports from several municipalities indicate that WWTPs are told that no special cleaning of their regular carboys

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is necessary, yet it is known that PFAS chemicals tend to adsorb onto the plastic material that carboys are made of. Routine composite samples for permit monitoring are being used. Is the tubing used in the autosamplers PFAS appropriate? When DNR staff take a portion of the carboy to be tested for PFAS, is there a defined protocol to ensure a properly mixed sample is obtained? Is the sub-sample from the carboy taken immediately after vigorous shaking? Or is transfer to the PFAS sample bottle performed so slowly or so long after shaking the sample that solids are already settling out? Is preservative added to the samples as required by the (drinking water) method being used? Based on discussions to this point, there is concern about the quality of samples being collected. There is an old lab adage that all the best instruments and analysts in the world are of no value if the quality of the sample collected is compromised.

In the final analysis, the legal authority to obtain PFAS samples from these municipalities is highly questionable and any decent attorney could quickly highlight that the emperor in this case has no clothes. It’s not abundantly clear what the DNR intends to use this data for, but citing arguably questionable authority, using an inappropriate method, combined with questions about how samples were collected make the data suspect. It seems unwise to use tax dollars to generate all this data when the results would be subject to question.

While I respect municipalities that submit to this sampling “request” in the interest of being good stewards of the environment, I encourage these same folks to respectfully challenge authority that is questionable in nature. Do not hesitate to review the legal language for authority cited and ask for assistance in understanding the language if it seems vague. In simpler terms, this is no different than a lab audit in which a lab is cited for a practice that the lab believes meets the intent of the regulation. The auditor may prefer that the lab do something differently, but a review of administrative code language used to substantiate the citation may show that the lab’s practice, while not what the auditor prefers, indeed satisfies code requirements.

There is certainly a need to perform some investigation into the extent of PFAS in our waters and wastewaters, but municipalities seem to be the targets, rather than the businesses that discharge PFAS. These investigations should be conducted with clear, unequivocal authority (or partnering), should use relevant, approved methodology, and sample collection protocols need to ensure that quality data are obtained. But we also have to remember that PFAS compounds are not yet regulated in this state.

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