CONGRATULATIONS

EEI would like to recognize the following employees for their milestone anniversaries with the company in 2023.

5 Years:
Jake Seger

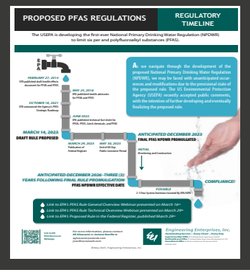
10 Years:
Chris Ott

15 Years:
Kyle Welte

25 Years:
John Whitehouse
Denise Thelander

DID YOU KNOW?

EEI has a PFAS Resources page located on our website? To stay informed about the latest developments, be sure to bookmark the webpage or sign up for our email newsletter.



ENTEPRISES TRIVIA CHALLENGE

Q: Of all water on the Earth's surface (70%), how much of it is suitable for drinking (percent)?

Submit answers to eei@eeiweb.com by 9/15 to be entered into a drawing for a $50 gift card!

Engineering Enterprises, Inc. (EEI), founded in 1974, is an award winning consulting engineering firm providing services to public agencies and private entities throughout northern Illinois. Our expertise includes water, wastewater, transportation, stormwater, construction management, land surveying, GIS and municipal consulting.

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CHANGE IS GOOD - BRINE, BIOLOGY, BACKWASHING AND BAD STEEL

Communities are constantly challenged with deciding when and how to replace aging infrastructure. Various practical and political factors impact these decisions, and the costs and benefits must be carefully evaluated.

In 2016, the City of Batavia embarked on a journey to develop a Water Works System Master Plan that assessed potential improvements to the Water Treatment Plants (WTPs) and strategized an approach for phasing and financing the necessary improvements. The City's goals for the WTPs improvements focused on several key objectives:

- Drinking Water Quality and System Efficiency
- Operator Safety at the Facilities
- System Reliability Through Proactive Maintenance

Execution of the Plan was launched several years ago upon initiation of design engineering and the application for a loan from the Illinois EPA State Revolving Fund Loan Program. Construction began in 2021 and is projected to be complete by the end

IN THIS EDITION

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CHANGE IS GOOD - BRINE, BIOLOGY, BACKWASHING AND BAD STEEL, CONT'D

of July 2023, backed by an IEPA SRF loan of approximately $4.5M, which will be paid back over 20 years at a rate of 1.35%. The City Council have been informed monthly of construction progress, allowing a valuable opportunity for stakeholders to be engaged throughout the process. Any challenges faced have been met and surpassed to ensure the project goals are accomplished, as depicted in the following scope of work description:

The City's Water Treatment Plants 1 and 2 are separate facilities located on the same property. WTP 1 treats the three deep wells for radium removal using two Dualator filter tanks. Each Dualator is comprised of multiple parts: an aerator at the top, a detention tank in the center, and four filter cells at the bottom. Hydrous Manganese Oxide (HMO) is fed in the detention tank, which reacts with radium and allows it to be removed from the filters. Once the media in each filter cell becomes saturated with radium, the filters are backwashed to remove radium. Backwash flowed to an outside open-air storage lagoon and an adjacent lift station pumps the backwash to the sanitary sewer system.

The backwash lagoon posed safety concerns, the radium-laden solids from the Dualator filter backwash would accumulate in the lagoon and require periodic disposal as special waste. Additionally, the lagoon required frequent high-volume washdowns by operators, averaging over 1.3 million gallons of water annually. To improve operational efficiency, environmental safety, and avoid solids build-up, a new underground backwash storage tank was designed and constructed. This was accomplished without disrupting the Dualators' operations. The tank was designed with a sloped concrete floor which facilitates the backwash to the effluent gravity line that feeds into the lift station, resulting in minimal solids accumulation in the tank, and elimination of high-volume washdowns.

The work scope also included rehabilitation of the Dualators with new filter media to ensure better water quality and optimized filtration performance. These tanks had been in service for over 30 years without rehabilitation, and they could not be inspected prior to construction due to operational constraints. As a result, the condition of the steel tanks' interior was an unknown factor in the design phase, requiring multiple assumptions for the rehabilitation's scope. However, once the first Dualator was taken offline and cleaned during construction, it was determined many components showed significant deterioration and required major repairs or replacement. The City, EEI, and the contractor collaborated on cost-effective solutions that would allow for continued usage of the equipment and a more efficient treatment process. These same repairs were mirrored for the second Dualator, after the first Dualator was placed back into service.

Through preliminary discussions with the City, it was identified that the media in the Dualator filter cells was biologically active and able to remove ammonia from the raw water. As the presence of ammonia requires a high chlorine demand to achieve target-free chlorine residual, the biological removal of ammonia in the filter was beneficial as it significantly reduced the chlorine feed requirements. Therefore, the City desired to preserve this biological treatment in the filters. To achieve this, a strategy was implemented to remove a small amount of existing media for use as seed media, mixing it with the new filter media to kickstart the biological treatment. City staff maintained the biological activity of the seed media throughout construction by feeding it a steady source of ammonia-laden raw water and evaluating its performance. Once the Dualator rehab was complete, the seed media was spread evenly in each filter cell together with the new media. The City discovered that it took approximately 40 days for the seed media to fully proliferate and achieve complete ammonia removal.

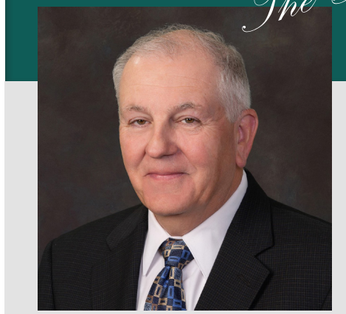
At WTP 2, the removal of iron and manganese from the three shallow wells is addressed through chlorination and pressure filtration. A chlorine generation system is part of this plant as well. To produce the necessary brine solution for this system, the City relies on food-grade salt, and when blended with electricity, yields a sodium hypochlorite (chlorine) to oxidize the iron and disinfect. The brine storage tanks, chlorine generators, and sodium hypochlorite pumps were all situated in the same area. To fill the 8-foot tanks, operators had to carry each 45-pound bag of food-grade salt up ladders to the tanks. In addition, the pallets of food-grade salt were stored near the treatment equipment, which posed accessibility and safety concerns. To improve safety and operational efficiency, a new brine building was designed and constructed to include two new, recessed brine tanks, which allowed operators to load salt in at waist-level. Additionally, new sodium hypochlorite pump skids were installed, replacing old, unreliable pumps that were difficult to maintain. Altogether, these improvements to the brine and sodium hypochlorite system have significantly improved safety and operations at the facility.

Rather than wait for potentially catastrophic equipment failure, the City opted for proactive maintenance, rehabilitating and replacing six high-service pumps at the WTPS and three deep wells, all of which were operational but showing signs of decline. By including this in the project bid, not only did it allow for an efficient phasing plan that minimized disruption of operations, it also assisted in lowering the cost in comparison to emergency repairs.

This project encountered twists and turns, yet, due to thorough planning, open communication with stakeholders, and creative solutions, the City managed to overcome the challenges and successfully achieve the project goals.

-Emily M. Conti, EI, Project Engineer

The Final CHAIRMAN'S CORNER



PLANNING AND BEYOND

Planning is sometimes underappreciated, but it is and has always been critical to success. I would add that it is now even more crucial for communities. In our consulting practice, we encourage communities to prepare plans to guide their capital investments, whether they are for large infrastructure components, such as roads, water systems, or sewer systems. We believe developing a plan and following it is the best way to head off problems and save money. It is also a great tool for communicating with the public and gaining support.

Our region has enjoyed plentiful water resources for as long as I can remember. While we still have abundant resources, they are finite. If we want to reach sustainability it will require that we move to the next phase in water supply planning that includes active management of our water resources and water use.

What does actively managing water resources look like?

The Northwest Water Planning Alliance (NWPA - https://www.nwpa.us/) is developing a water sustainability plan for the NWPA region. The plan will analyze regional water resources and population and water demand projections to determine whether we have enough water supply for the region. More importantly, it will identify strategies that can help manage the resource so sustainability can be achieved. The NWPA effort is intended to provide a roadmap that communities can follow to make their own determinations and manage their future water supply. It will identify options that are available and the potential actions they can take. The plan is currently being developed and is expected to be completed in late 2024.

The world is changing. We can either manage our water resources or they will manage us. It is important to realize that planning is only the first step, though. Once a plan is developed, we will need to be committed to utilizing the plan to manage our water resources to ensure a bright and sustainable future.