



LIFT Scholarship Exchange Experience for Innovation & Technology (SEE IT)
Sponsored by: WRF, WEF, and NACWA

TRIP REPORT

SCHOLARSHIP UTILITY: *NEW Water, Green Bay Metropolitan Sewerage District, Green Bay, WI*

SCHOLARSHIP UTILITY CONTACT: *Matt Schmidt, Operations Trainer, mschmidt@newwater.us*

ATTENDEES: *Jake Becken- Treatment Leader, Phil Mentink- Staff Engineer, Matt Schmidt- Operations Trainer*

TRIP DATES: *4/7/19 – 4/11/19*

UTILITIES/SITES VISITED: *Metro Wastewater Reclamation District, Denver, CO
Hampton Roads Sanitation District, James River WWTF, Newport News, VA
Alexandria Enterprises, AlexRenew Facility, Alexandria, VA*

TECHNOLOGIES/INNOVATIONS SEEN: *Gravimetric Selection Technology (Hydrocyclones),
Anammox Retention through Hydrocyclones*

TRIP BACKGROUND and RATIONALE (250 WORDS): *What technology did you select to visit? What is the problem you are trying to address? How did you envision the LIFT SEE IT scholarship trip helping your utility?*

NEW Water has dedicated itself to the collection, treatment, and reclamation of 38 million gallons of wastewater each day. NEW Water is continually looking to improve the treatment process and its technologies in order to provide the best service possible at the lowest cost to customers of the district. Historically, NEW Water has experienced poor settling of the biomass in the final clarification process at the Green Bay Facility, which has resulted in high SVI's. In order to improve settling, NEW Water has looked at new, innovative technologies to implement at the Green Bay Facility.

Gravimetric selection technology provides a method for retaining the more dense mixed liquor biomass from the aeration systems, while selectively removing the lighter, less dense fraction, which has been known to include filamentous bacteria. Increased density of returned MLSS biomass can lead to improved settling characteristics, which can improve SVI's, improve prevention of solids loss in the final clarifiers, increase the hydraulic throughput, and potentially encourage the selection of phosphorous accumulating organisms (PAO's).

Site visits to facilities where gravimetric selection technology has been implemented gives NEW Water staff firsthand experience and insight on the successes and challenges of

implementing a pilot or full scale operation of this technology along with gaining knowledge about any process challenges and/or roadblocks that have occurred. NEW Water would be able to share its experiences with other utilities who may be interested in implementing similar technology in the future, which is valuable in our ever-changing world of technological improvements.

TRIP SUMMARY (1 page max. Please include 10 photos and a 1-2 minute video montage from the trip. The video does not need to be professional, however if you have the means to create a professional video feel free to do so): *Why did you select the specific utility and technology for the visit? Based on your visit, do you think this technology/approach works for your utility? How useful was the trip in your decision making process? What were some of the trip highlights and takeaways?*

With the assistance of an innovation and process engineer, the NEW Water team was provided a list of facilities within the United States that were either piloting or operating full scale hydrocyclone operations for improving process performance through gravimetric selection technology. After careful consideration, the Metro Wastewater Reclamation District of Denver, the James River Wastewater Treatment Facility of Hampton Roads Sanitation District, and AlexRenew of Alexandria Enterprises were chosen to give a wide representation of the technology in three different and unique applications.

Denver has more of a conventional BNR facility that is similar to the operations at NEW Water's Green Bay Facility. Since November of 2018, inDENSE™ Hydrocyclones (World Water Works) have been in operation on one of their A/O basins targeting granular formation and retention of their biomass. Staff at Denver initially installed a very robust pilot before going full-scale. Based on the information provided, this technology has had an observable impact on clarifier performance and SVI's. Effluent TSS from the associated final clarifier has shown a decrease in effluent levels. Visual observations have yielded increases in the overall growth of aerobic granules within said system. Furthermore, Denver is awaiting results of DNA microbial analysis to provide more details on the changing dynamics within the biomass within their system. Staff at Denver also provided valuable information on maintenance, pumping systems, and other process considerations when using this technology.

Hampton Roads Sanitation District (HRSD) was at the forefront of pioneering hydrocyclones for granular MLSS formation. Like Denver, applications of World Water Work's inDENSE™ are being utilized in two different applications: One is at a very low-SRT IFAS facility (James River Wastewater Treatment Facility), and the other is installed at a very small (100,000 gpd) package plant on a single train. The site visit to the James River Wastewater Treatment Facility (JRWTF) allowed the team to view the hydrocyclones in a similar setup to Denver, but with a slightly alternative pumping system. Based on feedback from HRSD staff, mixed results on hydrocyclone performance have been observed at the JRWTF to date. Staff indicated that inDENSE™ may not be advantageous to their facility due to low SRT's required for the IFAS treatment configuration. Marginal results have been observed that indicate granular aerobic biomass is being augmented. HRSD staff has

performed extensive work on testing and piloting various sizes of hydrocyclones since 2015. Based on their experience, smaller hydrocyclones yield better results for granular biomass augmentation. Hydrocyclones sized for a throughput of 10 cubic feet/hour are recommended.

The team wrapped up the tour with a site visit at AlexRenew in Alexandria, VA. Stringent effluent requirements for total nitrogen drove staff at AlexRenew to implement process changes to meet permit compliance. Available facility space is a limiting factor at the campus, as the surrounding community has encroached to the point there is no longer room for additional capital infrastructure so they have been enhancing their process in the existing infrastructure. AlexRenew has installed the DEMON® system, which utilizes Anammox biomass for reducing ammonia from side stream dewatering flows. The augmentation of Anammox biomass is accomplished through hydrocyclones for retention in the system. AlexRenew has also implemented full-scale installation of hydrocyclones in their mainstream aeration system to promote Anammox retention for additional total nitrogen removal. Staff is still implementing seeding their mainstream aeration with Anammox bacteria. The performance of the mainstream hydrocyclone system for Anammox retention cannot be determined at this time, due to the infancy of the project.

Technology is continually advancing in water reclamation. The science behind the technology is promising, and the potential for enhanced treatment performance appears to be favorable when implementing said technology. With increasingly stringent regulatory compliance demands and an aging infrastructure, it was very interesting, inspiring, and noteworthy to see how other utilities of the future are tackling these important issues. The team was quite impressed how staff at these particular site visits are making their processes perform better within the same footprint using emerging technologies such as hydrocyclones. The trip was invaluable, as it provided information and critical operational points that will help drive whether a pilot or full-scale operation of this technology will be considered during the development of our upcoming liquids facility plan.