FORTY-X™ DISC FILTER

JAMES A. KING WASTEWATER TREATMENT PLANT

An all-new treatment facility is designed to meet the clean water needs of future generations

THE CITY OF BARNESVILLE, GEORGIA IS PREPARED FOR THE FUTURE WITH ADVANCED PHOSPHORUS REMOVAL TECHNOLOGY FROM EVOQUA WATER TECHNOLOGIES.

About an hour south of Atlanta, the city of Barnesville, Georgia is a town of shady, tree-lined streets, a fondness for celebrating its history, and a sharp eye on the future. In 2013, as its 30-year-old wastewater treatment plant was reaching the end of its useful life, Barnesville found itself planning for a future of growth, progress, and a new, state-mandated <0.6 mg/L total phosphorus (TP) wastewater discharge limit.

Forty-X™ Disc Filters from Evoqua are installated at the James A. King WWTP to address phosphorus removal requirements.

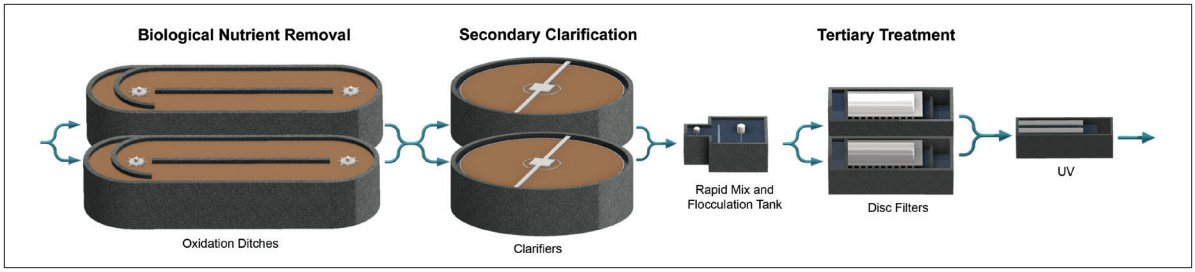
In response, the city contracted with Stevenson & Palmer Engineering, Inc. to design and build a $12.5 million, 2.4 MGD wastewater treatment plant with capacity to meet the needs of Barnesville's 10,000 residential and business customers. Also, since the majority of its treated wastewater would discharge into nearby Tobeesofkee Creek, the system was required to meet the new state-mandated TP limits. Heyward, Inc., located in Atlanta, GA helped secure the contract as Evoqua's manufacturers' representatives.

To meet the new TP standards, the design engineer specified an additional stage of chemical phosphorus removal which included a rapid mix and floc tank for precipitation, followed by filtration. At the engineer's recommendation, and based on a long-standing record of success with Evoqua Water Technologies, Barnesville selected Evoqua's Forty-X Disc Filter for the plants tertiary filter.

Barnesville's requirements for the filter system included a compact footprint and simple, cost-effective operation. The Forty-X Disc Filter had several key advantages for meeting Barnesville's requirements. It is simple to install and operate, and features an innovative pleated panel design that provides more filtration media per square foot than similar flat panel designs. The pleated panel design also includes a robust pressure-assisted seal that allows the panel to sustain and operate at a higher head. In addition to the system itself, Evoqua provided up-front hydraulic and construction drawings for the project.

OPTIMIZING THE CHEMISTRY

Part of the engineering effort included an important extra step: a lab test to determine the right chemical for optimum filtration. In collaboration with Barnesville and operating partner ESG Operations, Inc., Evoqua used the plant's award-winning on-site lab facilities to test three different precipitation chemicals: poly-aluminum chloride (PAC), potassium aluminum sulfate (alum), and ferric chloride. In the test, baseline samples of effluent were collected and analyzed from each anticipated precipitation point, then put through an artificial rapid mix and flocculation stage for a calculated period of time to simulate plant conditions. Once the time elapsed, each sample was filtered through 10-micron Forty-X cloth filter media and results were analyzed.



The system commissioned in January 2015, uses oxidation ditches for biological nutrient removal and clarifiers for secondary treatment and chemical phosphorus removal. Solids are treated by aerobic digestion followed by sludge dewatering via a belt filter press.

Based on this test, alum yielded the best overall results for phosphorus removal. PH adjustments and the addition of polymer were also analyzed for each chemical tested, but neither treatments were required to meet the < 0.6 mg/L limit.

Once the best chemical was determined, dosage was evaluated in the online treatment system. Both single point injection and multiple point injection were tested and the results documented. It was determined that the optimum chemical injection was multiple point injection. Alum was fed at the clarifier influent with a dosing range of 15–40 mg/L. It was also fed in front of the rapid mix and floc tank at the disc filtration influent at a range of 5–20 mg/L.

Once the correct dosage was determined, the Forty-X Disc Filter's effluent was monitored and the filter's operational settings were adjusted to achieve peak performance. Although the chemical reaction between the alum and phosphorus resulted in a slightly higher solids loading on the Forty-X filter, this loading remained well within the filter's capabilities.

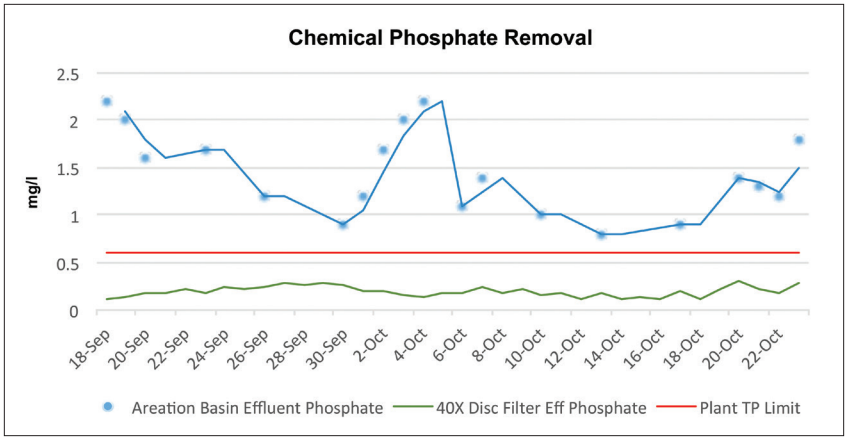
85% TP REDUCTION

As tested, the chemical removal process was able to achieve 85% reduction in TP and yield an effluent quality of < 0.3 mg/L of phosphorus, 50% below the allowable limits for this facility. Barnesville's next-generation treatment plant, with its Forty-X Disc Filter as the tertiary treatment stage, is currently meeting its permit requirements reliably and cost-effectively ... with room to grow.

As a side benefit, the test provided a set of data that documents the performance of the Forty-X Disc Filter in phosphorous removal. Detailed data for this test is available from Evoqua on request.

RESULTS

The chemical removal process achieved an 85% reduction in TP. Final effluent quality had a level of < 0.3 mg/L TP, exceeding the required limit of 0.6 mg/L by 50%.



The figure illustrates the phosphorus levels as the chemical removal stage begins. Floc is formed and captured by the Forty-X Disc Filters with the effluent leaving the filters well below the plant TP limit.

Industry

Municipal Wastewater Treatment

Business Challenge

Meet new limits for phosphorous reliably and cost effectively for the next 30 years.

Keys to Success

Use of a qualified laboratory to determine the best chemical for the application and employing multi-point chemical injection.

Solution

- Multi-point chemical injection
- Coagulant selection
- Optimized chemical dosing
- Evoqua Forty-X Disc Filter for tertiary treatment
- 10-micron filter media

Results

- Final effluent < 0.3 mg/L TP, 50% below EPA limit (lab value)
- Operational limit of <0.6 mg/L TP met reliably and cost effectively

The Forty-X™ Disc Filter from Evoqua utilizes a proprietary pleated media for efficient Phosphorus removal.

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EVOQUA WATER TECHNOLOGIES

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