Teaming Up on a Significant PFAS Mitigation Project



The challenge

Commonly used in cookware, clothing, packaging, and coatings, perfluoroalkyl and polyfluoroalkyl substances (PFAS) contaminate surface and groundwaters. Levels as low as 7 parts per trillion (ppt) are considered hazardous to humans, causing numerous health issues and negatively impacting the environment. Two PFAS compounds, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), have been directly linked to cancer, liver and thyroid issues, ADHD, and reduced fertility.

Following the Environmental Protection Agency's (EPA) issuance of a health advisory for PFOS and PFOA in May 2016, a north Alabama drinking water utility was one of the water systems that had tests indicate higher concentrations of PFOS and PFOA than the newly released advisory level.

The utility provides residential and wholesale water to more than 25,000 customers in northern Alabama. The facility was treating an average of 6.5 million gallons of water per day (mgd) from the Tennessee River with a granular activated carbon (GAC) adsorption system located downstream from a hollow-fiber filtration system. To meet their treatment goals and implement a more effective and permanent solution, the utility engaged InSite Engineering of Hoover, Alabama, to conduct a pilot study to evaluate their existing GAC system against ion exchange, traditional reverse osmosis (RO), and closed-circuit reverse osmosis (CCRO).

The solution

Multiple companies, including Aria Filtra®, participated in the pilot study. Taking the utility's treatment goals and needs into consideration, Aria Filtra combined microfiltration (MF) membranes with the IMPRO™ system, which featured CCRO

> *"During the pilot study, we did not get a hit on any PFAS compound on the permeate side of the RO membranes. We consider it a raging success to remove everything that we saw coming in. We absolutely expect to be a non-detect on every PFAS compound that's in the Tennessee River when the full-scale system goes online."*
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> **Bryan K. Pate,** P.E., Managing Member, InSite Engineering

technology, into a solution for PFAS removal. By using full-sized modules and membranes for the test, InSite Engineering was able to evaluate the exact solution that would be purchased, providing further confidence that the system was ideal for the customer.

Aria Filtra provided 24/7 support for the utility's operators throughout the study. According to utility staff, the Aria Filtra team helped their operators identify issues, make adjustments, and become familiar with the ins and outs of the system. "Having the [Aria Filtra] team just a phone call away was a big help when we were running the pilot," they explained. "We were operating three systems simultaneously—the two in the study, plus our own. We had to make sure we were completely operational with no impact on quality, while effectively evaluating the others."

The results

During the pilot study, laboratory testing detected seven different PFAS compounds coming out of the Tennessee River. The goal was to remove all of those to below detection limits during the study and going forward. With the Aria Filtra solution, the team was successfully able to meet that treatment requirement.

Additionally, the system achieved a 90% recovery rate. Based on this figure, when the facility reaches capacity of 16 mgd, a 1.6 mgd waste stream will be generated, instead of 4 mgd generated through a traditional RO system. With lower flow running through the waste stream, the utility will be able to use their existing GAC system to treat this waste with a higher contact time before discharge back to the Tennessee River.

The utility and InSite Engineering identified that CCRO delivered the most consistent operation with the lowest cost of ownership. Estimated capital and operating costs of the MF/CCRO solution from Aria Filtra is 30% less than the GAC system and 11.5% less than the combined ultrafiltration and traditional RO system tested.

Based on the results, InSite Engineering and their customer selected to move forward with the Aria FLEX™ membrane filtration and IMPRO systems from Aria Filtra. The initial plan is to use a brackish water membrane, which gives the water authority the flexibility to easily swap modules to a tighter RO membrane should PFAS regulations grow more stringent in the future.

Along with the addition of the Aria FLEX and IMPRO systems, the utility will replace its existing submerged membranes with Aria Filtra membranes due to their reliability and to ensure a single source of responsibility throughout the membrane and RO treatment process. Construction on the upgraded facility began at the end of 2019, with the new plant expected to be fully operational in early 2021.

The benefits

By combining the Aria FLEX and IMPRO systems, this north Alabama drinking water utility will create a consistent, long-term treatment process that is capable of adapting to future regulations as new derivatives of PFAS emerge. Other benefits include:

- **Broadest removal of all PFAS varieties, resulting in nondetect levels in finished drinking water**
- **Industry-leading recovery rate**
- **Easy-to-operate system with reliable performance**
- **Reduced operating costs and lower energy consumption**

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Aria Filtra, a division of Trojan Technologies, is the filtration partner of choice for municipal and industrial customers that need reliable access to consistent, high-quality water. With more than two billion gallons of installed capacity spanning six continents, Aria Filtra has the process expertise, proven technology, and intelligent systems that customers trust to reliably tackle their most complex water treatment challenges. Featuring industry-leading durability, reliability, and ease of operations, our broad portfolio of solutions ensures mission-critical functions continue to work as needed, day in, day out, for years to come. Learn more at AriaFiltra.com.

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