GRANULAR ACTIVATED CARBON (GAC) ELIMINATES PFAS FOR THE KENNEBUNK, KENNEBUNKPORT & WELLS WATER DISTRICT (KKWWD) IN MAINE

AquaCarb® CX enhanced coconut carbon from Evoqua Water Technologies filters PFOA and PFOS contaminants to below detection limits in a municipal well, preserving the integrity of the water supply in this fragile region.

Water is the lifeblood of community and industry in the picturesque seacoast towns of Kennebunk, Kennebunkport and Wells, Maine ... where tourism, farming, and commercial fishing help drive the local economy.

That's why, in 2016, when two prevalent perfluoroalkyl substances (PFAS) — perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) — were detected in one of the system's supply wells, KKWWD acted quickly to address the contamination. PFAS have extreme chemical stability, are resistant to degradation, and bio-accumulate in the blood and certain organs of the body. While the full health impact of PFAS is still being determined, lab studies have linked PFAS to liver injury as well as adverse effects on growth, development, and reproduction.

Proactive, precautionary measures

In the KKWWD supply well, the combined level of the two contaminants, at 50 parts per trillion (ppt), was within the combined limit of 70 ppt as recommended by the U.S. Environmental Protection Agency (EPA). With the health effects of this entire class of contaminants still under investigation, KKWWD decided to proactively shut down the affected well as a precautionary measure and evaluate the best course of action.

First, KKWWD needed to solve a mystery: where did the contaminants come from? PFAS compounds are typically associated with industrial activity and the use of fire retardants at military installations. Neither of these applications were an exact match for this community. Investigation ultimately pieced together a chain of cause and effect: agricultural runoff from a local farm that had applied soil enhancers made with biosolids from a municipal waste water plant, combined with fly ash that came from a local paper mill (since closed).

Evoqua: a technology-agnostic partner

To remove the contaminants, KKWWD turned to Evoqua to explore treatment options. Evoqua has worked with many municipalities like KKWWD as a leading provider of a full portfolio of PFAS treatment technologies, including GAC, Single Pass Ion Exchange Resin available in permanent or emergency mobile assets. With years of experience in PFAS removal and a technology-agnostic approach to filtration solutions, Evoqua was well-suited to identify and provide the most cost-effective solution for the project.

KKWWD expressed a preference for GAC, based on experience and familiarity with the technology. Evoqua examined water quality data and advised the District on a pilot test of several types of carbon, including the competitor's, to determine which would perform best for their local water chemistry.

The solution: AquaCarb CX enhanced coconut carbon

Testing of multiple types of GAC systems turned up an effective, efficient solution: Evoqua's patented AquaCarb® 1230CX enhanced coconut-based carbon and the HP® 1220SYS high-pressure liquid-phase adsorption system. Test results showed that this system, compared to other tested carbons, would provide significantly longer full-scale run time before requiring service and reactivation.

Results: PFAS-free water, longer time before reactivation

As installed at KKWWD, the Evoqua system consists of two 12-foot diameter 20,000 lb vessels in a lead/lag configuration. According to KKWWD, the full-scale 700 gpm PFAS removal

system has been operating "very well" since it was placed into service, producing more than 200 million gallons of excellent quality, PFAS-free water to date. KKWWD fully expects to meet their goal of 250 million gallons of PFAS-free water per year from these filters and is moving ahead with a permanent structure to house the system.

"Our goal is to continuously produce drinking water with non-detect levels," says Norm Labbe, KKWWD Superintendent. "With Evoqua's lead-lag system we should have no problem."

In addition, KKWWD met another important goal: removing PFAS without impacting their water rate plan. By working directly with Evoqua, KKWWD was able to implement a solution that added minimally to capital costs. The overall impact to ratepayers will be about $0.03 - $0.04/day and the customers won't see the increase for several years. Labbe says, "It's still cheaper than buying water from an outside water utility and it keeps us independent."

Post installation, Evoqua is available to provide all the services KKWWD needs to reactivate the carbon, including removal, transportation to Evoqua's reactivation facility in Darlington, PA, and the return to KKWWD for reuse.

Summary

KKWWD achieved its goal of providing water to its community with non-detect levels of two PFAS compounds: PFOA and PFOS. Evoqua's determination to provide KKWWD the most effective solution combined with the best price paid off with an ongoing partnership and drinking water virtually free from PFAS, in a tourist-based economy that places high value on pristine natural resources.

Advantage of AquaCarb CX enhanced coconut carbon

Evoqua's AquaCarb® CX coconut-shell carbon delivers up to 160% longer bed life compared to the coal-based alternative (bituminous GAC), resulting in up to 40% lower life cycle costs.

Evoqua Solution

- Granular Activated Carbon lead-lag system using enhanced coconut-based carbon

Features and benefits

- High performance media
- Cost-effective solution
- Consistent partnership

Results

The GAC system supplied by Evoqua removes PFAS to non-detect levels.

"Our initial goal was to produce drinking water with levels below that of any regulated limit anywhere in the nation. With Evoqua's lead-lag system we should have no problem."
Norm Labbe, KKWWD Superintendent.

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