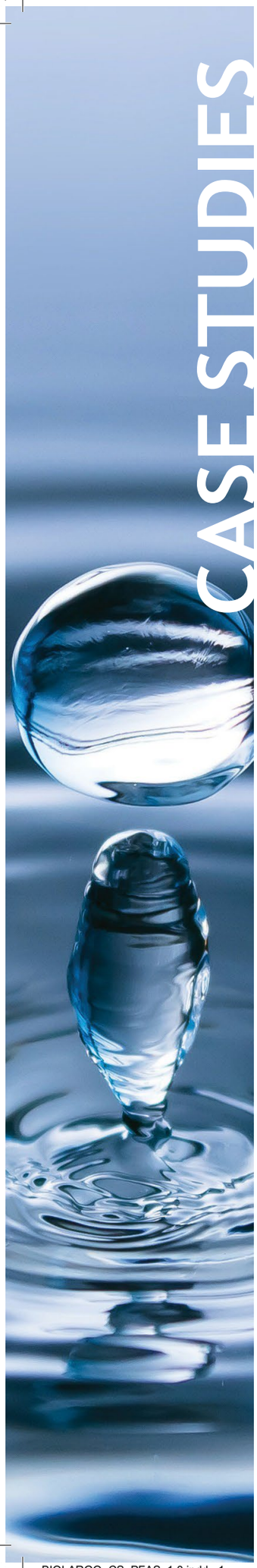


AEC CASE STUDY

AQUEOUS ELECTROSTATIC CONCENTRATOR

BioLargo Aqueous Electrostatic Concentrator (AEC) PFAS Removal System

Proven effective in removing both long chain and short chain PFAS from water to non-detect.

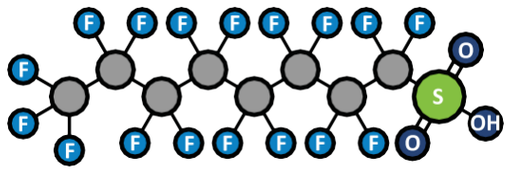
SUMMARY:

A small municipality in Wisconsin needed a treatment process to remove per- and polyfluoroalkyl substances from their water. BioLargo's Aqueous Electrostatic Concentrator (AEC) was tested and found to remove all nine PFAS compounds targeted from their water to below non-detect levels. Unlike carbon filtration or ion exchange, the AEC removed both long and short chain PFAS while generating little PFAS-laden waste. The process also reduced the chloride concentration in the water which has been a concern for the municipality.

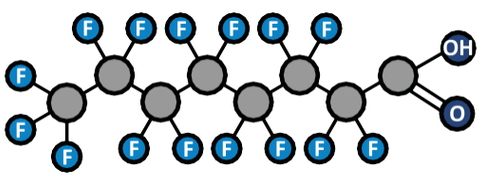
THE PROBLEM:

The municipality's drinking water wells were contaminated with nine different per- or polyfluoroalkyl substances (PFAS), water pollutants including the six PFAS chemicals subject to the EPA's proposed drinking water limits. Traditional decontamination technologies like carbon filtration and ion exchange are expensive, inefficient, and not well-suited to treating water of this quality. High chlorides and a mixture of long and short chain PFAS made traditional treatment a challenge. Media filtration also would generate large amounts of PFAS-contaminated solid waste.

PFOS

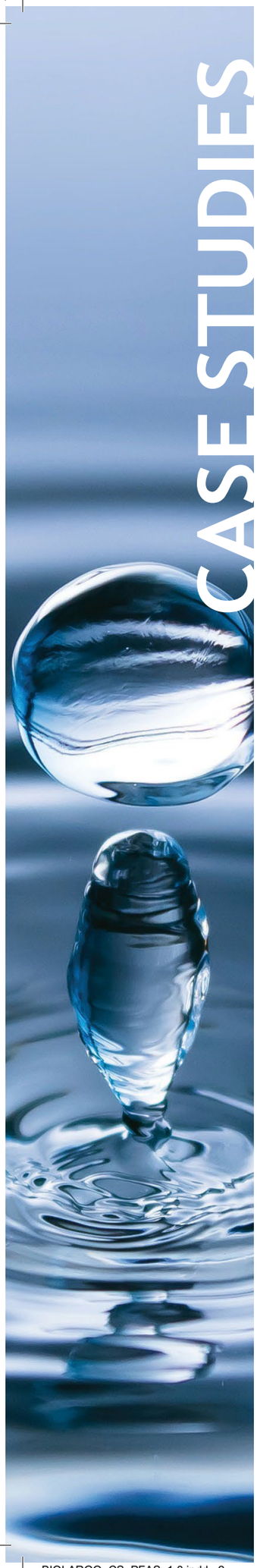


PFOA



Per- and polyfluoroalkyl substances (PFAS) are man-made chemicals that contaminate 60% of public wells in the US. They are linked to myriad adverse health effects. New regulatory efforts made one municipality search for a better treatment alternative to traditional technologies ion exchange or carbon filtration.

BioLargo Engineering, Science & Technologies



AEC
AQUEOUS ELECTROSTATIC CONCENTRATOR

THE SOLUTION:

The municipality and BioLargo Engineering, Science & Technologies, LLC (BLEST) agreed to assess treatment of their PFAS-contaminated water by BioLargo's Aqueous Electrostatic Concentrator (AEC), a patent-pending system that exploits the unique properties of PFAS molecules to rapidly and effectively deposit them onto proprietary membranes.

PFAS-laden water was sent to the BLEST facility in Oak Ridge, TN. After the baseline water chemistry was analyzed, the system parameters of the AEC were selected to optimize PFAS removal. All water analysis was completed and verified by the University of Tennessee.

To assess the range of treatment performance provided by the AEC, the municipality's water was passed through the system either once, three times, or five times. Water samples were collected before treatment and after each subsequent pass through the system.

RESULTS OF THE CASE STUDY:

Of the nine different PFAS compounds identified in the municipality's water, the AEC reduced all of them to below the limits of quantification ("non-detect") in a single pass,

WI Municipality		
Compound	Raw	Final
PFBS	7.61	0.00
PFHpA	1.27	0.00
PFHxA	1.69	0.00
PFHxS	8.88	0.00
PFOA	4.23	0.00
PFOS	8.88	0.00
6:2 FTS	2.11	0.00
PFPeA	1.27	0.00
PFPeS	0.42	0.00

PFAS Removal Exceeds the Proposed EPA Regulations for Drinking Water

Samples were evaluated by resonance time with the longest being less than 30 seconds in chamber. Electrical usage of the unit remained steady dropped significantly in the later treatment stages when used in series, meaning increases to operating costs of the system resulting from longer contact times are marginal. The system was tested in conjunction with an RO, by treating the RO concentrate to offer flexibility in design. This did not affect the efficacy, removing the PFAS and returning all RO water back to the system for minimal water loss. Its flexibility, efficacy, low operating costs, and tunable operating parameters prove the technology is commercially viable for use at this municipality.

For more information about BioLargo's AEC technology, go to biolargoengineering.com or email tonya.chandler@biolargo.com

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