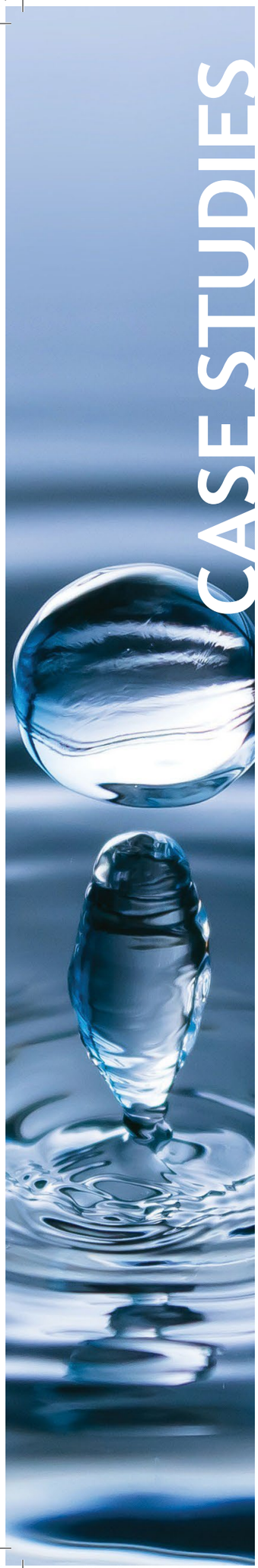


AEC AQUEOUS ELECTROSTATIC CONCENTRATOR CASE STUDY

BioLargo Aqueous Electrostatic Concentrator (AEC) Proven Effective for Chloride Removal

Effective in removing 99.9% of chlorides in a single pass.

SUMMARY:

In two separate bench-scale the BioLargo AEC removed 99% of all chlorides in a single pass. Water and wastewater was submitted by a Wisconsin municipality and a food manufacturer with the goal of reducing the chloride levels.

THE PROBLEM:

Chlorides in wastewater pose an interesting challenge to both municipalities and the food and beverage industry. Excess chlorides from manufacturing processes make their way into collection systems and wastewater plants, wreaking havoc on NPDES permit discharges. Many of the traditional treatments are insufficient to treat chlorides to the necessary levels or are cost prohibitive to the manufacturer. Finding a suitable chloride removal system has been a difficult challenge … until now.

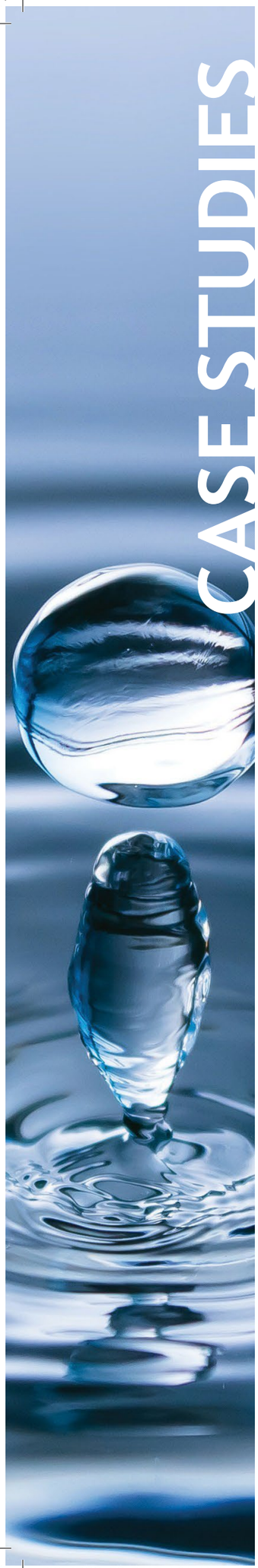
The Dangers of Chlorides in Drinking Water

"It only takes 1 teaspoon of salt to pollute 5 gallons of water to a level that is toxic for freshwater ecosystems"

https://www.wisaltwise.com/

Test Items	Raw Water
Conductivity (µs/cm)	921
pH	7.6
Chloride (ppm)	236
Calcium Hardness as CaCO3 (ppm)	98
Total Alkalinity as CaCO3 (ppm)	60
TDS (g/L)	0.557
Magnesium (ppm)	12.6

BioLargo Engineering, Science & Technologies



THE SOLUTION:

The municipality and BioLargo Engineering, Science & Technologies, LLC (BLEST) agreed to assess treatment of the chloride-containing water and wastewater by BioLargo's Aqueous Electrostatic Concentrator (AEC), a patent-pending system that separates ions in water in a unique way.

Totes of chloride-laden water were 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 chloride removal. All water analysis was completed and verified onsite 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.

Test Items	Final	Removal Rate (%)
Conductivity (µs/cm)	4.4	99.5
pH	6.6	-
Chloride (ppm)	0.31	99.9
Calcium Hardness as CaCO3 (ppm)	0.25	99.7
Total Alkalinity as CaCO3 (ppm)	0.04	99.9
TDS (g/L)	0.016	97.2
Magnesium (ppm)	0.02	99.8

RESULTS OF THE CASE STUDY:

The testing shows that the AEC can remove up to 99.9% of the chlorides from the water in a single pass. Along with chloride, the system is also able to remove other ionized constituents. Samples showed up to 97% overall reduction in total dissolved solids.

Electrical usage of the unit remained steady in the first stage and dropped significantly in the additional stages when used in series, meaning increases to operating costs of the system resulting from additional passes are marginal. System cleaning was initiated after 300 hours to reduce the impact of scaling. Its efficacy, low operating costs, and feasible operating parameters prove the technology is commercially viable for use at this water district.

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

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