

# Achieving Complete Destruction of PFAS Using Axine's electraCLEAR™ Process

## Project Highlights

- Pilot trial at a midwestern US industrial facility
- Seamless integration with an existing foam-fractionation treatment technology
- 99.995% destruction of long and short-chain PFAS
- Planned implementation of destruction systems at multiple sites

## Challenge

Manufacturing facilities have long relied on per- and poly-fluoroalkyl substances (PFAS) in their operations. With recent tightening EPA regulations, manufacturers need cost-effective methods to capture and destroy PFAS in wastewater, groundwater, and stormwater discharges. This need is critical as many publicly owned treatment works (POTWs) now refuse to accept waste streams containing such contaminants.

In early 2023, a large industrial client in the midwestern US engaged Axine to address PFAS destruction in wastewater from its manufacturing processes. Recognizing the potential impact of pending regulation, the site had already begun capturing and concentrating PFAS using foam-fractionation (FF). To mitigate long-term risks and costs associated with offsite disposal, the site sought onsite destruction solutions and identified Axine's electraCLEAR™ technology for its safety and cost benefits over competing destruction alternatives.

## Approach

Axine initiated the project with a laboratory-scale test of the electraCLEAR™ process on a 10-gallon sample of concentrated waste, which contained 69,900–82,900 ppb of various PFAS and precursor compounds. Laboratory scale experiments showed >99.99% destruction of total detectable PFAS to below analytical detection limits using several different electrode combinations.



Axine's electraCLEAR™ pilot system on customer site

Encouraged by these results, the facility proceeded with pilot testing at one of its manufacturing sites and a fully containerized electraCLEAR™ pilot unit was delivered in early 2024. Concentrated waste from the foam-fractionation process was collected in 325-gallon totes for the electrochemical destruction process, allowing independent optimization of both systems.

Testing was conducted in two phases to evaluate and optimize the benefits of various electrode combinations. Samples were collected at regular intervals and analyzed using US EPA Methods 533 and 537.1 for PFAS, Total Organic Precursors (TOP) assay for precursor compounds, and US EPA Method 9056A for inorganic fluoride liberated from organofluorine. The phases were separated by a week to allow for complete laboratory analysis of the first phase results.

## Results

Pilot testing of Axine’s electraCLEAR™ process demonstrated 99.9%–99.995% destruction of all PFAS and precursor compounds in the concentrated foamate. TOP analysis showed no substantial precursors remaining in the treated water.

Based on these successful results, the facility is now evaluating the implementation of full-scale foam-fractionation and electraCLEAR™ destruction systems at multiple sites.

Table 1 – Treatment results of EPA regulated PFAS molecules.

PFAS Compound [EPA 533+ 537.1]	Before Treatment [ng/L]	After Treatment [ng/L]	Percent Removal [%]
FtS 8:2	66,000	5.3	99.992%
FtS 6:2	75,000,000	3,900.0	99.995%
PFOS	1,400,000	85.0	99.994%
PFOA	2,900	2.6	99.910%
PFHxS	14,000	1.2	99.991%
PFBS	510	2.5	99.510%
<b>Total PFAS</b>	<b>76,549,540</b>	<b>4,395</b>	<b>99.994%</b>

**Partner with Axine to safeguard your operations against PFAS regulatory challenges and ensure a sustainable, compliant, and efficient future for your industrial manufacturing.**

## About Axine Water Technologies

Axine Water Technologies provides innovative industrial wastewater treatment technologies that destroy toxic organic contaminants, including PFAS, active pharmaceutical ingredients (APIs), and other emerging contaminants on-site using electrochemical oxidation. With over a decade of treatment experience and more than 150,000 hours of commercial runtime, Axine helps industrial manufacturers meet discharge permit requirements, eliminate off-site disposal costs and bottlenecks, and reduce litigation risk.

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