

PFAS DESTRUCTION SOLUTIONS

# ONSITE PFAS REMOVAL

WITH FOAM FRACTIONATION

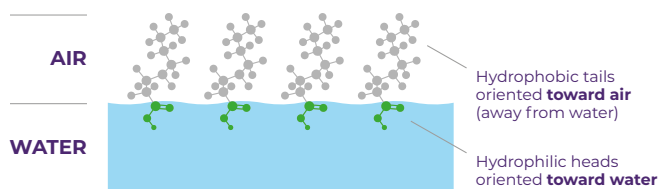


Bringing water to life®

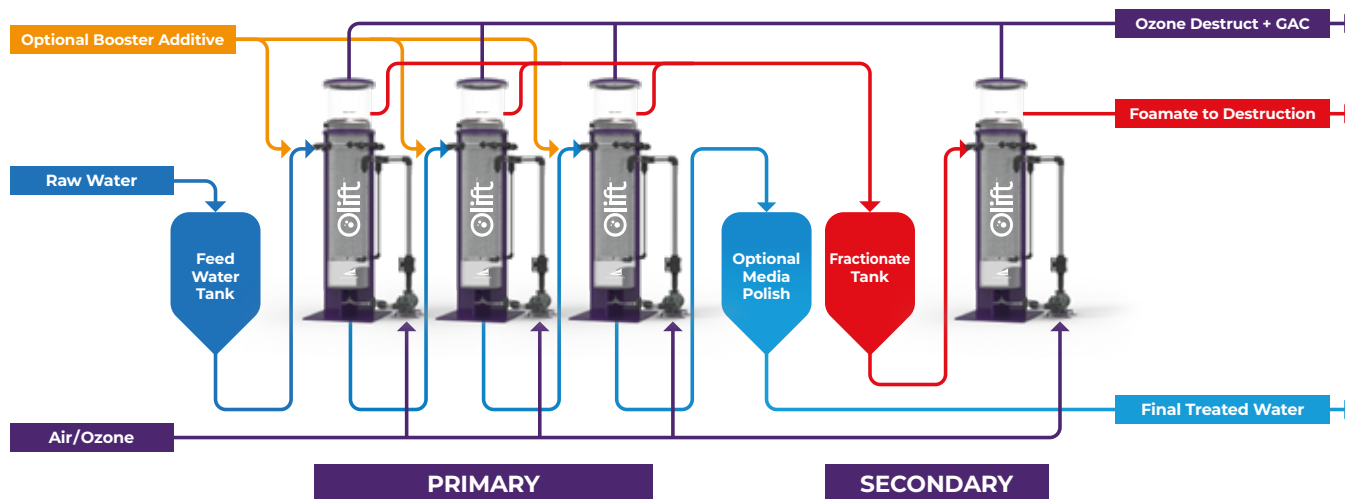
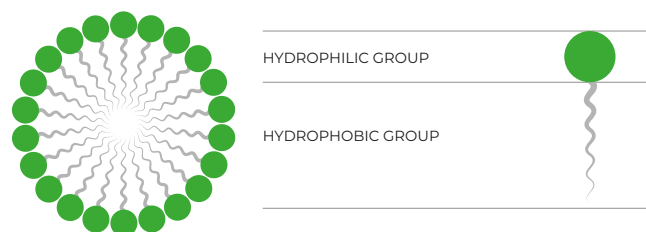
**Olift™, Ovivo's Continuous Foam Fractionation process featuring Evocra's patented technology, provides cost-effective and sustainable onsite per- and polyfluoroalkyl substances (PFAS) treatment solutions for municipalities and for industries throughout the United States and Canada.**

Olift™ selectively uses both **ozone** and **air** to create smaller bubbles with higher overall surface area and higher electrostatic charge compared to air-only systems, significantly boosting PFAS removal and concentration factors.

Ozone and/or air bubbles are introduced to a PFAS-laden water stream inside specially designed columns. Each PFAS molecule has a hydrophilic, or water-loving, head and a hydrophobic, or water-repelling, tail. Because of these properties, the PFAS molecules will align at the large ozone-enhanced gas-water interface at the bubble surface.



These small bubbles, along with the PFAS, rise to the water surface and form a concentrated foam, or foamate, at the top of a column, leaving relatively PFAS-free retentate (up to 99% removal of targeted PFAS). The foamate is separated and collapsed, and can be sent for more economical destruction. The small volume of foamate enriched with PFAS is generally between 1% and 10% of the influent treated, significantly reducing the size and energy requirements of Obreak™, Ovivo's electro-oxidation (EO) process for onsite PFAS destruction.



# Integrated PFAS Destruction Solutions for Municipalities and Industries

The common treatment approaches for removing PFAS from water are separation, using reverse osmosis, or adsorption, using a media (for example, granular-activated carbon, ion exchange resin). But in all these cases, the PFAS is simply separated from the water, leaving the possibility of PFAS being re-released into the environment. Moreover, these processes are costly.

Utilities or industry must consider where the PFAS will end up. The ultimate disposal and destruction of the captured PFAS must be considered and onsite PFAS



FOAM FRACTIONATION

ELECTRO-OXIDATION

destruction offers operators greater confidence with the lowest exposure.

Olift™, Ovivo's Continuous Foam Fractionation process, can be added to most flow sheets for PFAS removal. Pairing with Obreak™, Ovivo's electro-oxidation process, makes for a complete onsite destruction solution. Our team of engineers and field technicians are ready to assist customers in developing the ideal treatment approach to rid PFAS from their waste streams and water supplies while reducing liabilities associated with the generation of solid waste.



The Olift™ Continuous Foam Fractionation process distinguishes itself from other air-only-based foam fractionation unit operations:

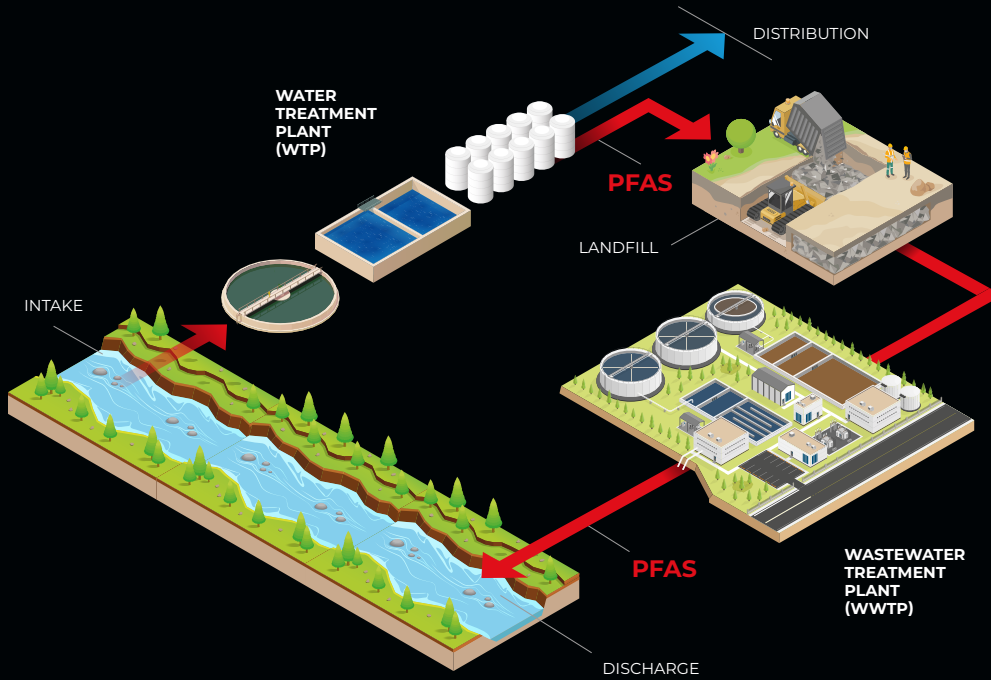
- The use of ozone ( $O_3$ ) in select columns produces smaller bubbles with more surface area than air (micro-bubbles vs. millimeter-sized bubbles).
- Ozone oxidizes other contaminants, which reduces downstream destruction and media polishing-competing co-contaminates.
- The process is continuous, not batch, for uninterrupted operation.
- The process is fully automated, with remote operation and monitoring capabilities.
- Suitable for removing PFAS from reverse osmosis concentrates, landfill leachates, industrial wastewater, military contaminated wastes, impacted groundwaters, and drinking water sources.

## COMPARISON OF AIR VS. OZONE IN CONTINUOUS FOAM FRACTIONATION

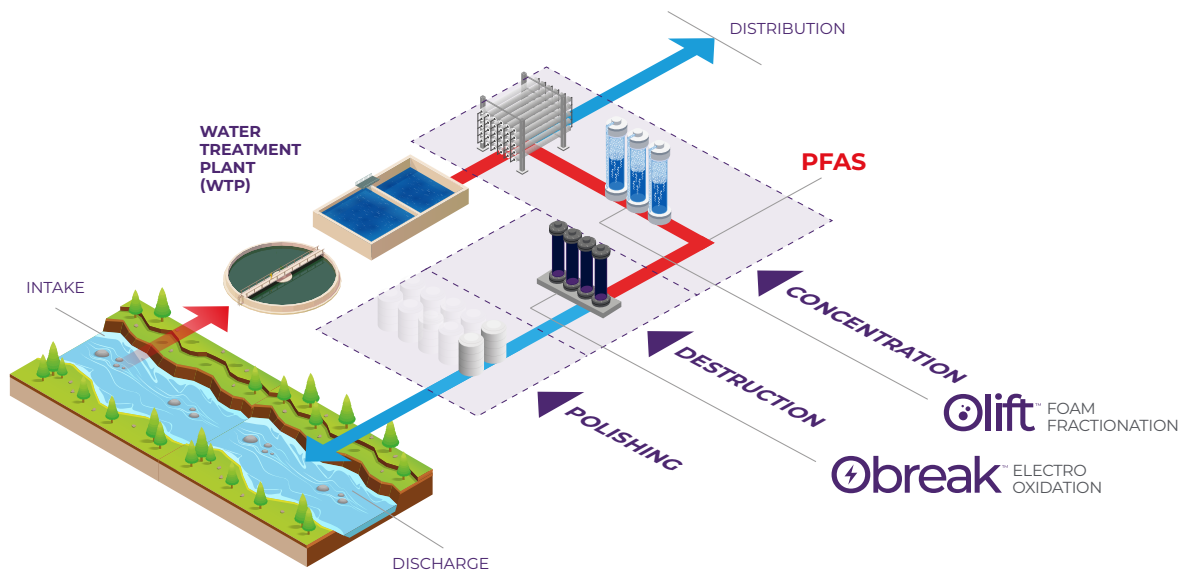
|                          | INFLUENT                | EFFLUENT                   |                                                   |                                                               |                                                 |
|--------------------------|-------------------------|----------------------------|---------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------|
| PFAS Compounds           | Leachate Average (µg/L) | Air/Air/Air Trial 1 (µg/L) | Air/O <sub>3</sub> /O <sub>3</sub> Trial 2 (µg/L) | O <sub>3</sub> /O <sub>3</sub> /O <sub>3</sub> Trial 3 (µg/L) | Air/O <sub>3</sub> /O <sub>3</sub> FINAL (µg/L) |
| PFBS                     | 1.45                    | 1.7                        | 1.9                                               | 1                                                             | 1.3                                             |
| PFPeS                    | 0.37                    | < 0.1                      | < 0.1                                             | < 0.1                                                         | 0.13                                            |
| PFHxS                    | 1.93                    | < 0.1                      | < 0.1                                             | < 0.1                                                         | 0.023                                           |
| PFOS                     | 0.86                    | 0.0002                     | 0.0002                                            | < 0.1                                                         | < 0.0001                                        |
| PFBA                     | 1.85                    | 1.3                        | 1.2                                               | 0.51                                                          | 0.005                                           |
| PFPeA                    | 0.70                    | 0.99                       | 0.92                                              | 0.21                                                          | 0.001                                           |
| PFHxA                    | 1.75                    | 1.4                        | 1.7                                               | 0.54                                                          | 0.5                                             |
| PFOA                     | 1.53                    | < 0.1                      | < 0.1                                             | 0.01                                                          | 0.004                                           |
| 6:2 FTS                  | 0.69                    | 0.005                      | 0.005                                             | 0.005                                                         | 0.005                                           |
| Σ PFAS                   | 12.19                   | 5.52                       | 5.87                                              | 3.81                                                          | 2.27                                            |
| ESTIMATED WASTE PRODUCED | –                       | ≈ 7%                       | ≈ 3%                                              | ≈ 1%                                                          | 1%                                              |



# CURRENT APPROACH



# THE OVIVO SOLUTION



**BREAK  
FREE  
FROM  
PFAS™**



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 pfas@ovivowater.com

Ovivo, with its 150 years of experience in water treatment and its nearly 1,500 dedicated water professionals worldwide, is **the preferred partner** for those who value water as much as we do. Our PFAS Solutions portfolio is leveraging expertise and innovation from across the company and through valued partnerships to allow our customers to affordably and effectively **BREAK FREE FROM PFAS™**.



Bringing water to life®