CASE STUDY

Olift™ Foam Fractionation System Removes PFAS from Industrial Sewage

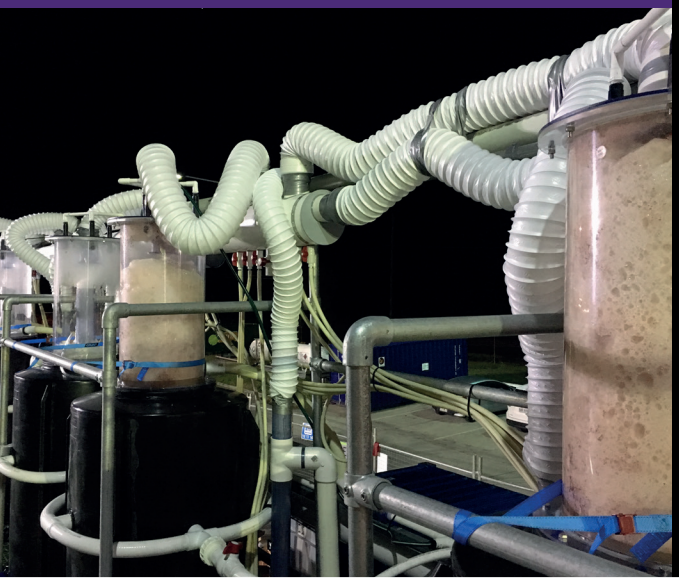
REMEDIATION PROJECT
Brisbane International Airport AFFF System Malfunction

MATERIAL
PFAS Contaminated Industrial Sewer, Estuarine Water & Industrial Cleaning Fluids

VOLUME
More than 4,750,000 gallons (18,000,000 liters)

PRINCIPAL
Airline Operator

LOCATION
Brisbane, Queensland, Australia



BREAK FREE FROM PFAS™

Olift™ FOAM FRACTIONATION

SUMMARY

Responding to an emergency request to remediate a PFAS impacted industrial sewer and surface water, a mobile Olift™ Foam Fractionation water treatment plant was rapidly deployed to resolve the complex treatment challenge. The plant was required to manage significant inlet quality fluctuation and meet strict regulatory criteria for discharge to the local municipal utility. Upon the safe and successful completion of the client's initial scope, without variations, the project was extended to PFAS impacted industrial cleaning fluids. All project expectations were met with treated materials discharged to contract specification and extracted PFAS concentrated for off-site destruction, removing the captured PFAS from the environment permanently.

The mobile Olift™ Foam Fractionation water treatment plant managed significant inlet quality fluctuations and complied with strict discharge regulations. After successfully completing the initial scope, the project extended to treat PFAS-impacted industrial cleaning fluids. All expectations were met; treated materials met contract specifications and concentrated PFAS was extracted for off-site destruction, permanently removing it from the environment.

THE CHALLENGE

Historical use of PFAS in aqueous film forming foam (AFFF), industrial surface coatings and other household products, coupled with their persistent nature and high mobility, has led to a widespread global problem. PFAS is a group of over 10,000 synthetic compounds, with current human health concerns dominated by specific compounds including PFOS, PFOA and others. Additionally, there is growing apprehension over the potential toxicity of many shorter chain PFAS precursor compounds. Traditional adsorbent methods do not provide a complete solution for PFAS. Adsorbent media, such as ion exchange resins and activated carbon, primarily target specific compounds such as PFOS, PFOA, and other long-chain PFAS. Limitations of adsorbent media include a lower adsorption efficiency to capture short-chain PFAS, high susceptibility to fouling when exposed to biology, blinding of the resin by many co-contaminants and solids, and the generation of relatively large volumes of spent media that requires landfill disposal at specialized facilities.

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TECHNOLOGY

The continuous flow Olift™ Foam Fractionation system uses a patented process for cost-effective, onsite removal and concentration of PFAS from contaminated waters, including reverse osmosis concentrates, wastewaters, groundwaters, and landfill leachates. Olift™ employs both ozone and air to create smaller bubbles (micro-bubbles) that have a higher surface area and electrostatic charge compared to systems using only air, improving PFAS removal and concentration factors. Ozone and/or air bubbles are introduced into a PFAS-contaminated water stream inside an Olift™ column, specifically designed and optimized for PFAS removal. Each PFAS molecule has a hydrophilic head and a hydrophobic tail, causing alignment and concentration at the gas-water interface on the bubble surface.

These small bubbles, containing PFAS, rise to the water surface and form a concentrated foam at the top of the column, leaving behind relatively PFAS-free treated water (retentate) with up to 99% targeted PFAS removal. The foam is then separated, collapsed and concentrated, allowing for a more economic destruction. The foam enriched with PFAS typically constitutes between 0.1% to 10% of the treated influent, which reduces the size and energy requirements for Obreak™, E2METRIX's Electro-Oxidation (EO) process designed for onsite PFAS destruction. The retentate can be sent to discharge or a media polishing step.

THE SOLUTION

Olift™, an innovative ozone foam fractionation technology reduced the PFAS into a concentrate of less than 1% of the original impacted volume. This reduction in volume conservatively saved the client an estimated $25M in waste management costs. Subsequent improvements to the process have decreased the concentrate volume to less than 0.2%. Utilizing a single Olift™ process train, the process was able to successfully remove the bulk PFAS and biological load from industrial sewer, storm water, estuarine water, caustic solvent cleaning solutions, and trade waste. This allowed processing by an RO-NF final polish system to meet the project discharge objectives. The competitive Olift™ technology, with its whole-of-project economic benefits and minimal footprint, integrated into the client's workplace, allowed the client to maintain all core operations while meeting their remediation obligations.

Olift™ consistently achieved treatment levels to below the local drinking water standards. The average discharge quality PFOA, PFOS, and PFHxS was <0.1 µg/L. Combining Olift™ with an RO-NF polishing unit reduced the total PFAS by over 99.9%, as measured via TOP Assay. The average sum of PFAS (TOP Assay) of 762 µg/L in the influent was reduced to an average sum of PFAS (TOP Assay) of Using advanced bubble technology, Olift™ removes PFAS and other contaminants without pre-treatment, delivering cost-effective, high-quality treated water.

CONTAMINANT	RAW INFLUENT		TREATED DISCHARGE	
	STD Analysis	TOP Assay	STD Analysis	TOP Assay
PFOS	87.44 µg/L	76.08 µg/L	< 0.01 µg/L	< 0.01 µg/L
PFOA	3.80 µg/L	3.62 µg/L	< 0.01 µg/L	< 0.01 µg/L
PFHxS	18.35 µg/L	19.10 µg/L	< 0.01 µg/L	< 0.01 µg/L
PFHxA	7.41 µg/L	30.78 µg/L	< 0.01 µg/L	< 0.01 µg/L
PFBS	3.23 µg/L	2.69 µg/L	< 0.01 µg/L	< 0.01 µg/L
PFBA	0.93 µg/L	6.52 µg/L	< 0.01 µg/L	< 0.01 µg/L
Sum of PFAS	**134.7 µg/L**	**160.2 µg/L**	**< 0.01 µg/L**	**< 0.01 µg/L**

PROCESS

The multiple foam fractionation columns of an Olift™ plant removed greater than 99.5% of regulated PFAS and greater than 84% of total measured PFAS from the raw influent.

The Olift™ process provides the following benefits:

- **Eliminates** down time from organic fouling due to its destructive treatment of organic compounds.
- **Eliminates** process obstructions by removing suspended solids from the process fluid.
- **Reduces** the number of unit operations required for complex water contaminations by using the multifunction reaction chambers.
- **Reduces** waste volumes, which reduces on-site costs and external transport and disposal costs.
- **Reduces** media usage by up to 75% in comparison to traditional methods.
- **Removes** contaminants from the environment eliminating risks to human health as well as other ecology.

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