Oxyle

Destruction solutions for short- and ultra-short-chain PFAS in industrial effluents and groundwater

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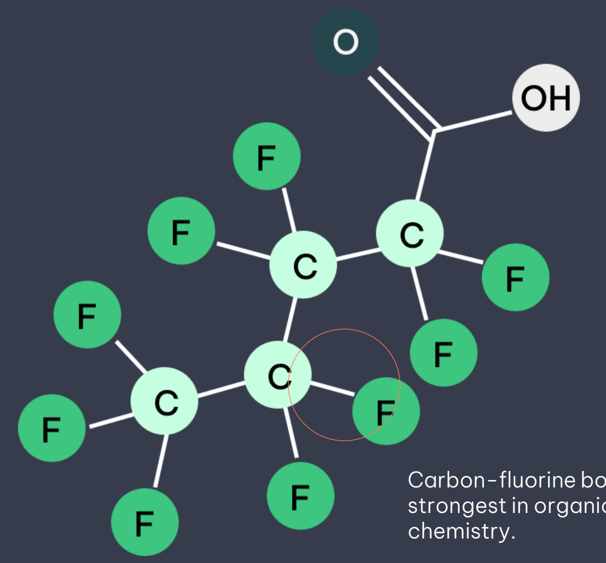
PFAS CHALLENGE

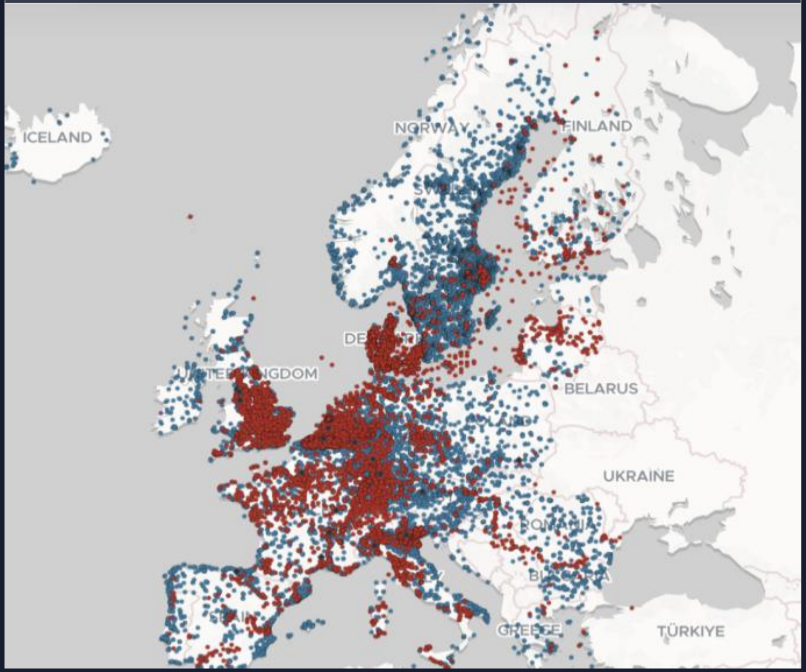
PFAS are a class of highly persistent, bioaccumulative chemicals embedded in thousands of critical industrial processes.

NO NATURAL DEGRADATION PATHWAYS

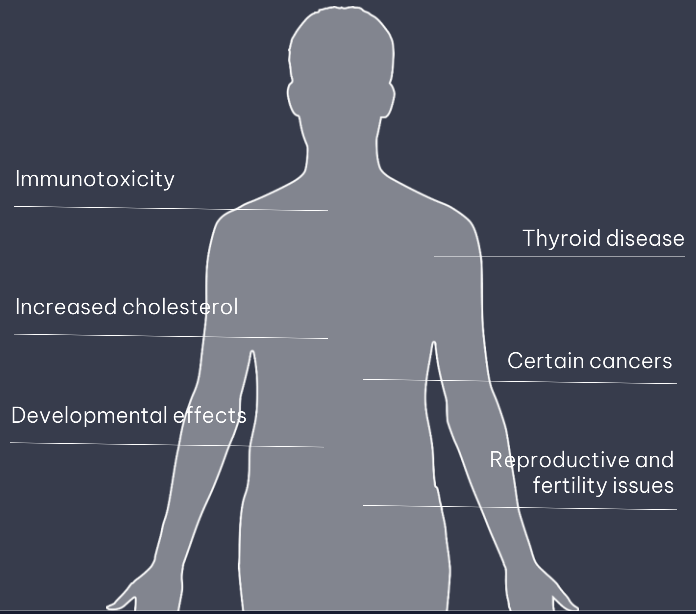


Carbon-fluorine bond is strongest in organic chemistry.

>23,000 CONTAMINATED SITES IN EUROPE



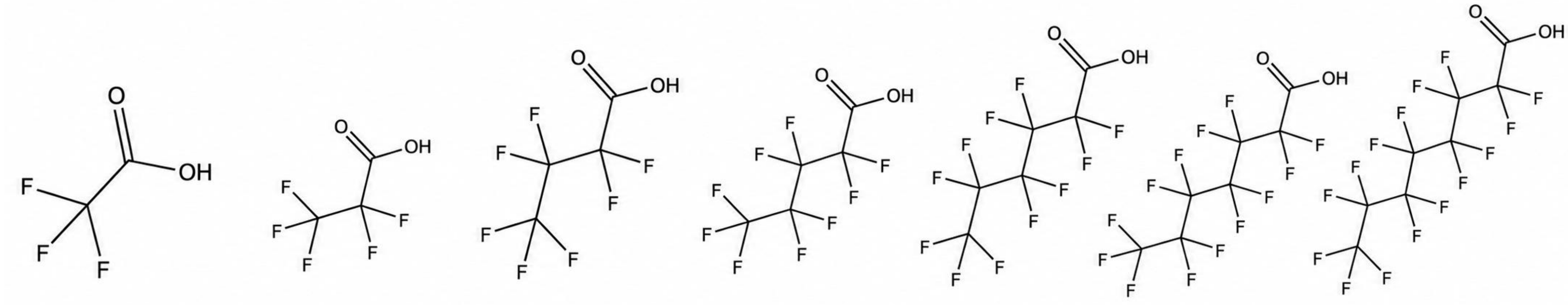
IMPACTS TO ENVIRONMENT & HEALTH



EXPANDING SCOPE

It’s not just PFOS and PFOA anymore. There are 10,000+.

ULTRASHORT CHAIN | SHORT CHAIN | LONG CHAIN



2	3	4	5	6	7	8
TFA	PFPrA	PFBA	PFPeA	PFHxA	PFHpA	PFOA

INCREASED: BIOACCUMULATION →

← INCREASED: ENVIRONMENTAL MOBILITY, DIFFICULT TO REMOVE

SOURCES: SWANA

REGULATIONS

Regulations are tightening faster than most organizations, and existing treatment systems, are prepared for.

Le Monde

France adopts 'one of the most ambitious' laws on PFAS

European Parliament

Urgency of regulating trifluoroacetic acid (TFA) and phasing out PFAS pesticides to safeguard water resilience and public health in the EU

Pesticide Action Network Europe

High concentrations of TFA in drinking water call for ban on PFAS-containing pesticides

ECHA
EUROPEAN CHEMICALS AGENCY

ECHA publishes PFAS restriction proposal

EURACTIV

EU requirement to monitor PFAS in drinking water takes effect

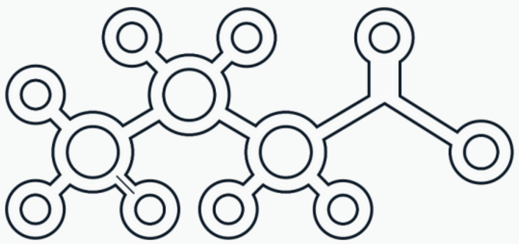
The Guardian

Investors pressure top firms to halt production of toxic 'forever chemicals'

TECHNOLOGY LANDSCAPE

Existing treatments were not designed to effectively destroy PFAS across the full spectrum, particularly short and ultrashort-chains.

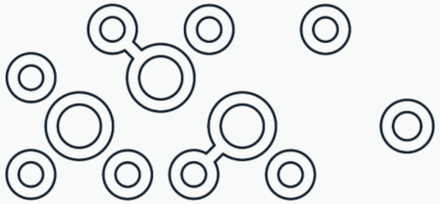
LEGACY REMOVAL TECHNOLOGY



Limited retention of short and ultra-short chain PFAS compounds.

High media turnover and significant secondary-waste burdens

EMERGING DESTRUCTION TECHNOLOGY



Variable performance for short- and ultrashort-chain PFAS.

High operational energy demands and limited scalability.

PFAS DESTRUCTION SYSTEMS

Oxyle engineers tailored PFAS destruction systems to permanently eliminate PFAS from wastewater, including the toughest short- and ultrashort-chains.

WHY OXYLE?

Beyond what conventional removal can address.

Destroy short- and ultrashort-chains.

Degrade and defluorinate high concentrations of PFAS (ppb to ppm) not effectively addressed by conventional removal processes.

Stay ahead of regulations.

Address TFA, PFBA, and other hard-to-treat PFAS ahead of tightening limits.

Reduce PFAS waste handling.

Eliminate the cost and complexity of managing secondary PFAS waste with on-site destruction.

Engineered for your water.

Maximize treatment efficiency with a system configured to your site’s chemistry and operating conditions.

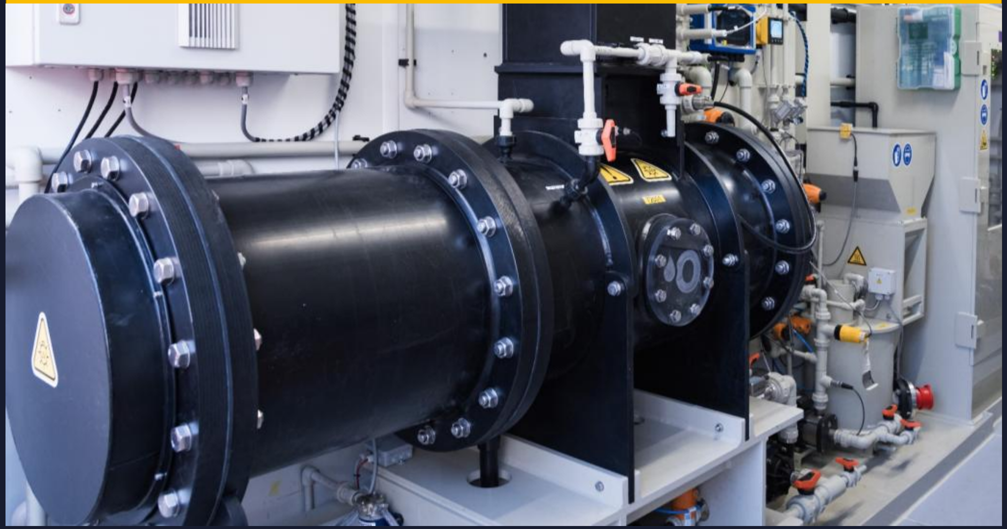
TAILORED SOLUTIONS

Destruction forms the core.

DESTRUCTION

OxLight

Best-in-class photochemical reduction technology.



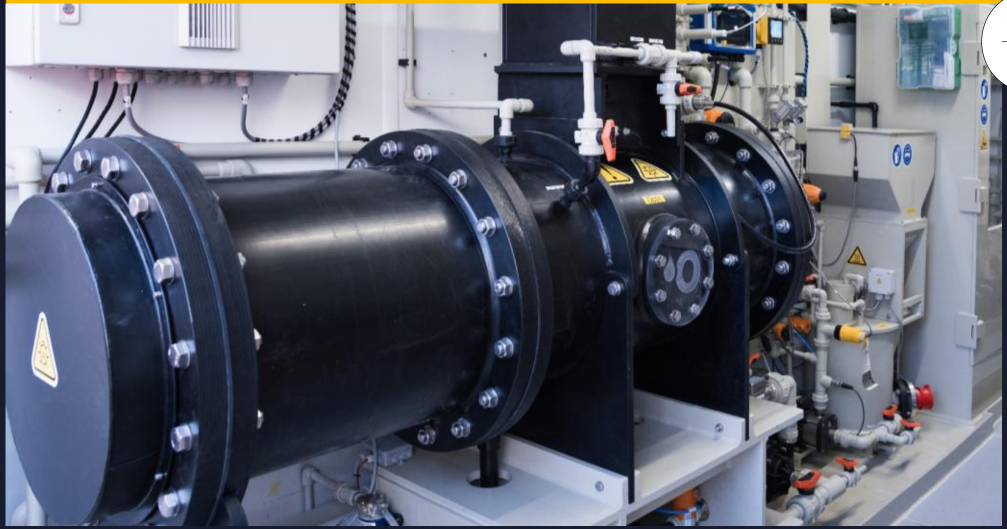
TAILORED SOLUTIONS

Destruction forms the core. With integrated optimization stages added as needed to maximize performance.

DESTRUCTION

OxLight

Best-in-class photochemical reduction technology.



MATRIX OPTIMIZATION

Condition the matrix to ensure efficient treatment.

CONCENTRATION & SEPARATION

Separate and concentrate PFAS into controlled streams.

MONITORING

Maintain system performance through continuous monitoring.

HOW OXLIGHT WORKS

OxLight, our proprietary photochemical reduction technology, uses UV light and mediator chemistry to degrade and defluorinate PFAS.

01

PFAS-contaminated water flows into the OxLight reactor.

02

Proprietary chemical mediators are dosed into the water. UV light activates the mediators producing reactive species.

03

These reactive species cleave the carbon-fluorine (C-F) bonds that make PFAS so persistent.

04

PFAS molecules are degraded and defluorinated, releasing harmless fluoride ions. Treated effluent meets discharge requirements.

WHO WE WORK WITH

For industrial and remediation operators who want future-ready PFAS management.

Chemicals

Pharmaceuticals

Construction

Industrial PFAS use

Industrial remediation

Waste management

OUR APPROACH SITE-SPECIFIC

The parameters we use to fine-tune your solution.

- Water stream
- PFAS compounds
- Concentration
- Discharge target
- Flow rate
- pH
- Conductivity
- Hardness
- COD
- Inorganic pollutants
- Salts
- Solvents
- Footprint
- ESG

Customer Case Studies

VALIDATED RESULTS

Oxyle solutions achieve over 99% degradation of PFAS, including hard-to-treat compounds like TFA and PFBA.

GROUNDWATER

LAB SCALE VALIDATION

>99% PFBA

Degradation in contaminated groundwater from a construction site.

Case Study 1

IND. WASTEWATER

ON-SITE PILOT

>99% C3 PFAS

Degradation in industrial wastewater on site.

Case Study 2

Case Study 1

CUSTOMER CHALLENGE

PFBA detected in groundwater at a construction site.

- Initial testing confirmed PFBA levels of approximately **8.0 ppb**, prompting a remediation program.
- Sought to meet environmental permits reaching PFAS effluent levels below 0.1 ppb, corresponding to >98% degradation

LAB SCALE VALIDATION

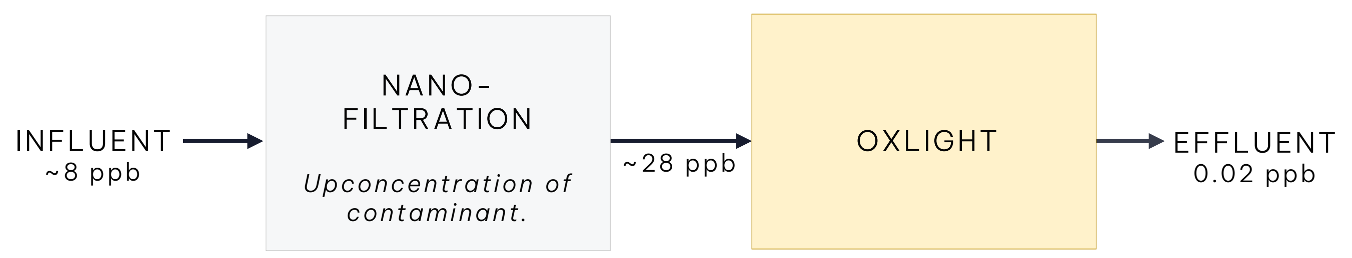
Case Study 1

INTEGRATED TREATMENT APPROACH

A multi-step solution was applied within an OxLight-based process framework.

- A robust, cost-efficient solution based on on-site destruction was required.
- To optimize the cost of treatment and footprint of the unit, upstream nanofiltration was identified as beneficial.
- Nanofiltration achieved a concentration factor of 3.5 from ~8 ppb to ~28 ppb.

PROCESS CONFIGURATION



Case Study 1

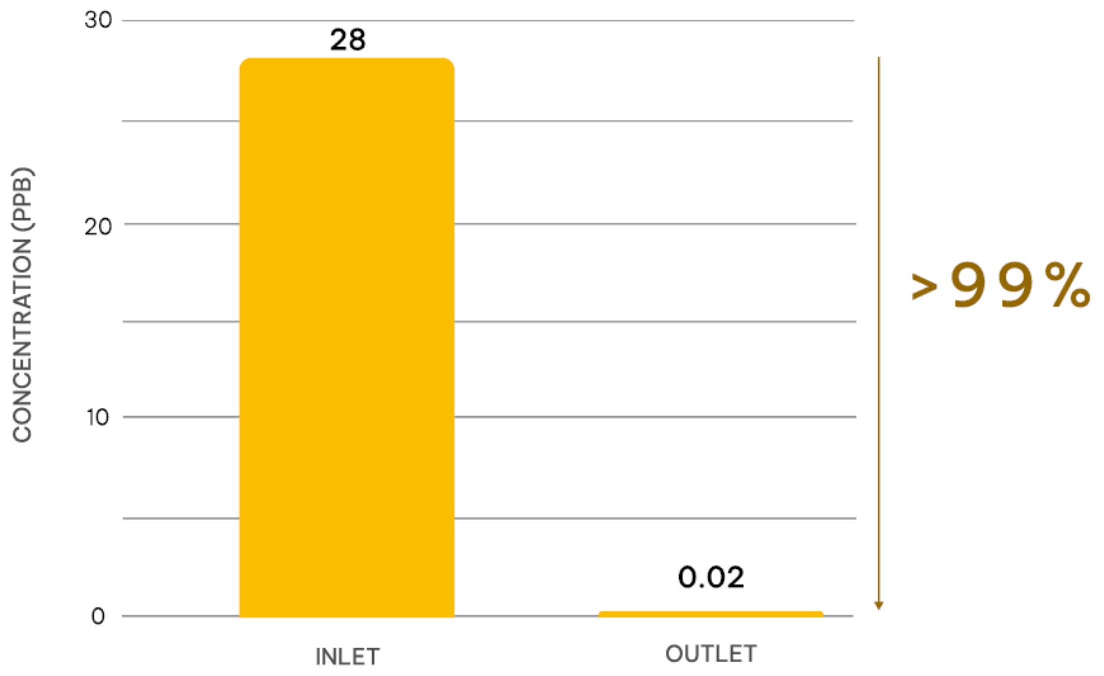
RESULTS

Successful destruction of PFBA in contaminated groundwater.

- Nanofiltration retentate was subsequently treated with OxLight.
- **>99% degradation of PFBA** compound was achieved, based on NF concentrate of ~28 ppb and 0.02 ppb at OxLight outlet.
- Performance results demonstrated high degradation efficiencies, exceeding the treatment targets.

TREATMENT PERFORMANCE — PFBA DEGRADATION

CHAIN LENGTH	INLET FEED (PPB)	NF CONCENTRATE (PPB)	OXLIGHT OUTLET (PPB)	DEGRADATION (%)
C4	~8.0	~28.0	0.02	>99%



Case Study 2

CUSTOMER CHALLENGE

USC C3 PFAS in two industrial process wastewater streams.

- Presence of an ultrashort-chain C3 PFAS identified in two wastewater streams at an industrial facility.
  - **Stream 1:** Simple matrix with various inhibiting inorganics and lower concentrations (<30 ppm) of C3 PFAS
  - **Stream 2:** Complex matrix with various inhibiting organics and inorganics and high PFAS concentrations (~70 ppm)
- Sought to optimize performance, reduce costs, and meet environmental permits.
- Required a robust, scalable solution based on on-site destruction, rather than phase transfer.

ON-SITE PILOT

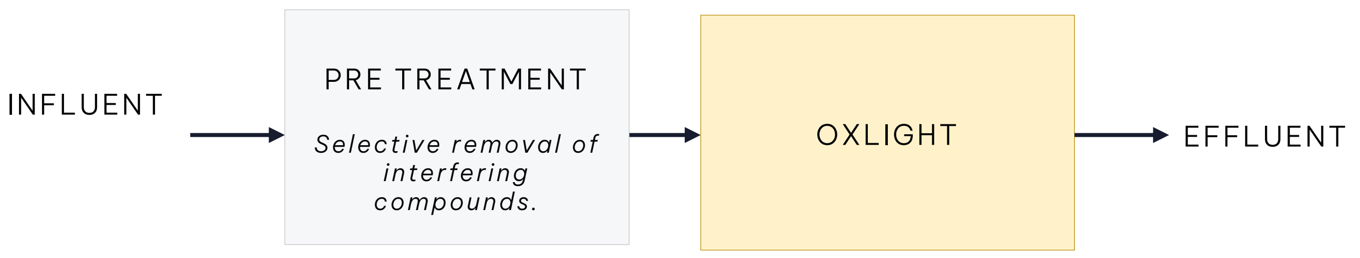
Case Study 2

INTEGRATED TREATMENT APPROACH

Two stream-specific OxLight based solutions piloted.

- **Stream 1:** A targeted pre-treatment step was introduced to selectively remove interfering compounds and ensure stable performance.
- **Stream 2:** Process has been focused on optimizing the mediator mixture to maintain treatment efficiency under challenging conditions.
- During course of pilot, several hundred liters of wastewater were treated in multiple batches.

STREAM 1 PROCESS CONFIGURATION



STREAM 2 PROCESS CONFIGURATION

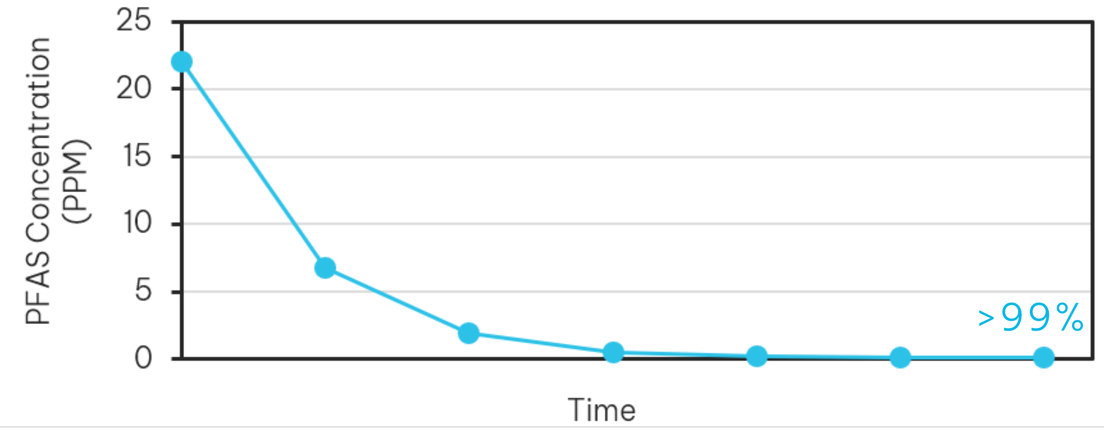
Case Study 2

RESULTS

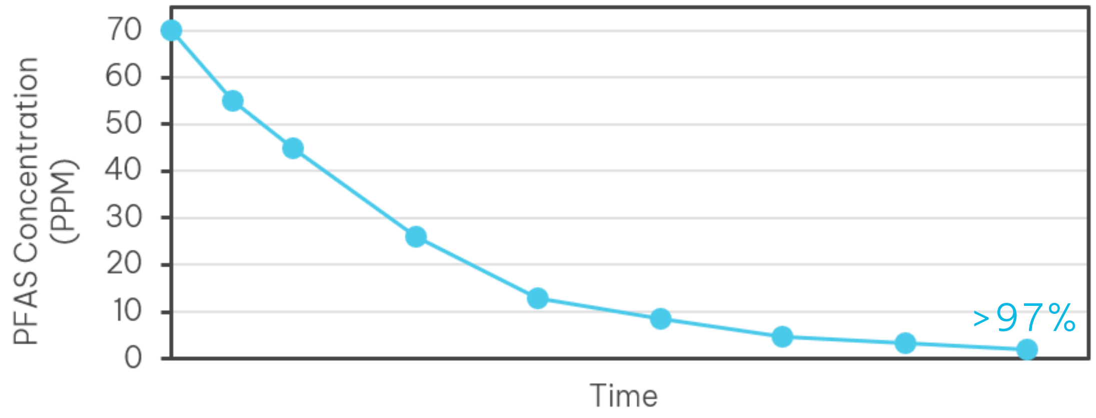
Successful destruction of C3 PFAS in industrial wastewater.

- Performance results demonstrated consistently high degradation efficiencies across both wastewater streams, confirming stable and effective operation under varying matrix conditions.
    - **Stream 1: >99% degradation of the C3 PFAS** compound was achieved across multiple independent water batches as PFAS concentrations varied by a factor of 10x.
    - **Stream 2: Degradation >97% was achieved**, demonstrating the system's ability to maintain high efficiency even as interfering matrix compounds varied by a factor of 10x.
- **Ready for scale:** Secured the data required to design, build, and deploy a full-scale solution.

STREAM 1 DEGRADATION RESULTS (<30 ppm)



STREAM 2 DEGRADATION RESULTS (<80 ppm)



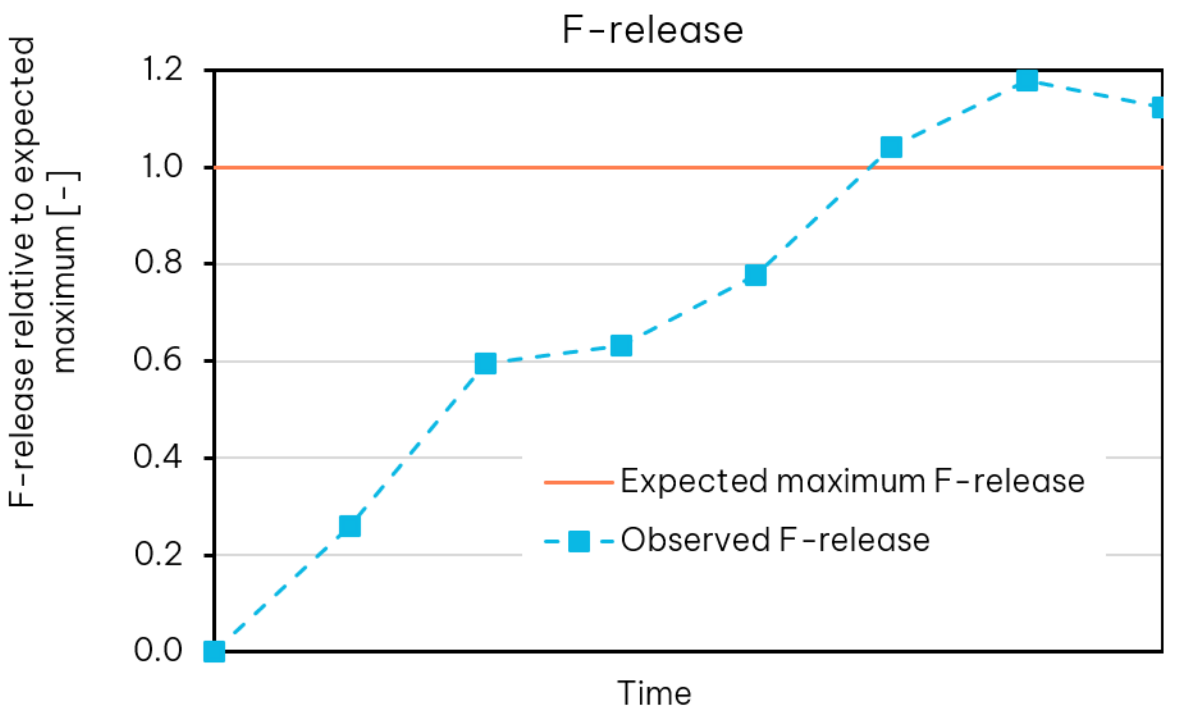
Case Study 2

RESULTS

Defluorination results confirm PFAS destruction.

- Defluorination was assessed on top of of degradation performance.
- **Fluoride release curve shows high degree of defluorination was achieved, surpassing expected maximum** before stabilizing due to measurement variability.
- Measurements **confirm C–F bond breakdown,** providing direct evidence of PFAS destruction.
- Analytical **screening did not indicate the formation of any fluorinated by-products** within the detection limits of the applied methods.

STREAM 2 DEFLUORINATION RESULTS



FROM ASSESSMENT TO OPERATION

How the solution comes together.

ASSESSMENT

1 month

- Characterize water
- Define treatment targets
- Assess site conditions
- Design framework

SOLUTION DEVELOPMENT

~3 months

- Engineer a site-specific system
- Technical validation
- Align on detailed design and deployment plan

IMPLEMENTATION

~6 months – 1 year

- Install and commission
- Validate treatment performance
- Prepare system for steady-state operation

OPERATION

Long-term

- Monitor performance and ensure compliance
- Maintain system reliability
- Drive continuous performance optimization

Oxyle

Get in touch.

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