

PFAS Recovery with Simultaneous Multi-Contaminant Removal

Increasingly stringent PFAS regulations require treatment technologies that can reliably remove PFAS while minimizing operational complexity, residual liabilities, and lifecycle costs.

Purifics has developed an integrated treatment approach that combines Continuous Ultra-Filtration (**Cuf**®) and Colloidal Activated Carbon (CAC) to recover PFAS while simultaneously removing multiple contaminants within a single treatment operation.

The technology has been applied across municipal, industrial, and remedial applications to provide:

- PFAS recovery to below analytical detection limits
- Simultaneous removal of organics and co-contaminants
- High water recovery and Zero Liquid Discharge (ZLD) capability
- Reduced infrastructure and operational complexity
- Simplified residual management

The PFAS Treatment Challenge

PFAS treatment technologies are increasingly being evaluated on more than contaminant removal alone.

Challenges commonly associated with conventional PFAS treatment technologies include:

- Competition from DOC/NOM
- Extensive pilot and column testing requirements
- Media replacement and disposal liabilities
- Concentrate management
- Multiple treatment steps and increased operational complexity
- Long-term lifecycle costs

Successful PFAS treatment requires an integrated approach that considers removal performance, water recovery, residual management, and operational sustainability.



Future-Ready PFAS Recovery Capability:

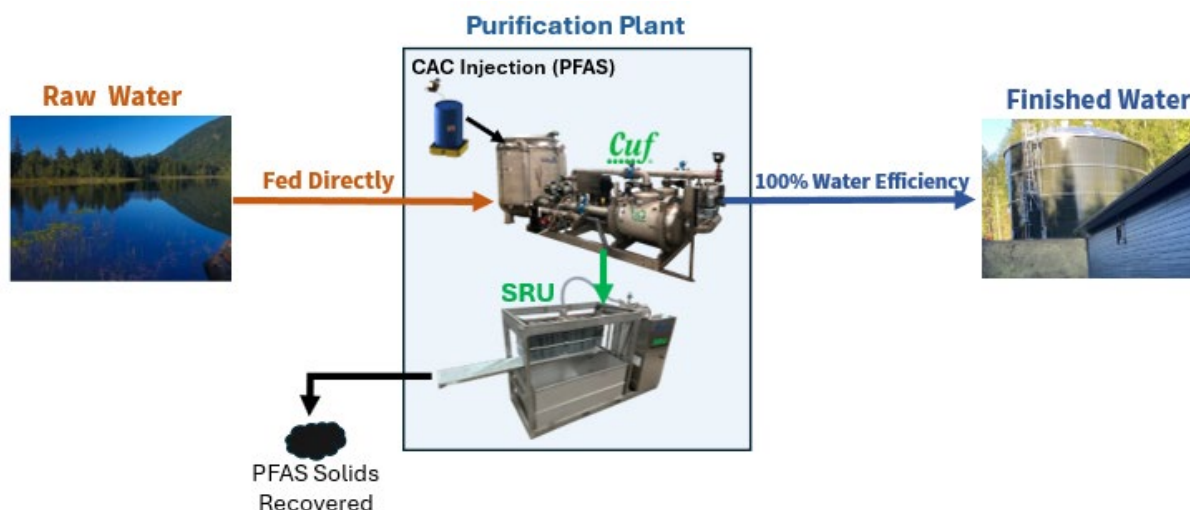
Cuf® systems can be equipped with an optional Colloidal Activated Carbon (CAC) injection system that enables PFAS recovery in both surface water and groundwater applications.

The CAC upgrade can be integrated during initial installation or implemented as a future enhancement, providing utilities and industrial users with a flexible pathway to address evolving PFAS regulations without requiring additional treatment trains or major plant modifications.

Through the simple addition of a precise CAC dosing system, existing **Cuf**® installations can immediately provide PFAS recovery capabilities. This flexibility is critical, as PFAS contamination may emerge in the future where it is not currently present or regulated.

How **Cuf**® with CAC Works

1. CAC is precisely injected into in-situ reactor (ISR) vessel, where highly concentrated mixing conditions promote immediate contact and rapid adsorption of PFAS onto the carbon particles without needing conventional upstream settling basins.
2. The PFAS-loaded CAC and flocculated solids are retained by 100% silicon carbide (SiC) ceramic membranes, while purified water passes through the membrane pores.
3. Purifics proprietary Dynamic Shock technology continuously cleans the membrane surface, maintaining stable performance without conventional backwashing or frequent chemical cleanings.
4. The Solids Recovery Unit (SRU) recovers PFAS solids as a low-volume residual while recovering water to achieve up to 99.99% recovery and Zero Liquid Discharge (ZLD).



The Advantage of Colloidal Activated Carbon (CAC)

The effectiveness of activated carbon is directly related to the availability of adsorption sites and the rate at which contaminants can reach them. Due to its extremely small particle size, CAC provides orders of magnitude greater accessible surface area than conventional activated carbons, resulting in significantly faster adsorption kinetics and more efficient PFAS capture.

Combined with Purifics' concentrated mixing environment and continuous feed-and-bleed operation, CAC delivers:

- Rapid adsorption kinetics
- Continuous replenishment of adsorption sites
- High accessible surface area
- Elimination of conventional column operation limitations
- Simultaneous PFAS and multi-contaminant removal
- Sustainable and low-cost operation

Performance data has demonstrated sustained PFAS reductions to below analytical detection limits from both groundwater and high-organic surface water sources while simultaneously removing multiple contaminants within a single treatment process.

Why CAC is Different from GAC & PAC:

- **Cost Efficiency**
- **Safety**
- **Kinetics**

Activated Carbon	Nominal Diameter Ratio	Nominal Surface Area Ratio
GAC	3,000	1
PAC	100	12,000
CAC	1	8,000,000



GAC



PAC



CAC



Proven Performance

- Demonstrated sustained PFAS removal to **<1.8 ppt**, in high-TOC surface waters.
- Validated across **municipal, industrial, and remedial installations**.
- **30-year track record** of Regulatory Compliance.
- Consistent removal due to steady state “feed and bleed” operation.
- Multi-Contaminant Removal

Parameter	Units	Raw Water	Cuf + CAC
TOC	ppm	2.77 - 3.67	< 0.72
TTHM	ppb	NA	1.3
HAA	ppb	NA	1
Geosmin	ppt	2.77	< 0.38
PFOS	ppt	14	< 1.8
PFOA	ppt	8	< 1.8
PFBA	ppt	12	< 1.8
PFPeA	ppt	2.2	< 1.8
PFBS	ppt	4.7	< 1.8
PFHxS	ppt	1.9	< 1.8
PFHpA	ppt	2.2	< 1.8
PFHxA	ppt	3.2	< 1.8
Total	ppt	48.2	ND

Hardin County, TN Data

Solids Recovery & Residual Management

A key challenge of PFAS treatment is not only removing PFAS from water, but also managing the residuals generated during treatment. The proprietary Solids Recovery Unit (**SRU**) continuously recovers PFAS-bearing solids as a low-volume residual stream while eliminating liquid waste generation.

This approach significantly reduces residual handling requirements, supports high water recovery, and simplifies long-term liability management.

What About Solids Disposal?

Once PFAS has been captured on CAC the question remains what to do with PFAS contaminated solids and their legacy liability. The following options are available:

- PFAS Disposal at Approved Landfill
- PFAS Off Site Incineration or Regeneration
- Pyrolysis

Integrated PFAS recovery, multi-contaminant removal, and residual management within a single treatment operation, CUF® with CAC provides a practical and sustainable pathway for addressing today's PFAS challenges and adapting to future regulatory requirements.

