

Learn more: <https://www.youtube.com/watch?v=bs1vtEjZjbw&t=39s>

## Better Water at Lower Cost

**Cuf** is a Continuous Ultra-Filtration process with proven performance since 2013. It is a quantum leap forward in water purification; effectively rendering all other MF/UF membrane processes obsolete. **Cuf** has no pre-treatment, no filtrate loss, no membrane replacement, and absolute filtration at its rating over the 25-year design life of the system. **Cuf** will capture and reduce your carbon footprint.

The **Cuf** process is a disruptive game changer for conventional engineering, cost structures and performance criteria. **Cuf** is more than just a filter.

**Cuf** systems have a much smaller footprint and significant complexity reduction over all other membrane filtration processes. Low TMP (Trans Membrane Pressure) with unmatched flux (5 times) and duty further contribute to operating and capital cost structure reductions in the 50% range.

**Cuf** is comprised of patented SiC ceramic membrane and process technology which is fully developed and optimized with multiple installation and multiple regulatory environments.

## Purification Capability

Removes and/or Recovers Particulate, Color, DOC, Pathogens (>5.7 LRV), TSS, VSS, Radium, Turbidity, Hardness, Oil, Cr<sup>6</sup>, Metals, H<sub>2</sub>S, Organic & Inorganic Phosphorous, THM & HAA Precursors, Taste & Odor compounds and Silica. All this is performed in a single **Cuf** platform which eliminates conventional pre, auxiliary and post treatments. **Cuf** is a complete Zero Liquid Discharge plant.

## Applications

Drinking Water   Wastewater   Reuse IPR/DPR   Remediation   Solvent Filtration   RO Pre-Treatment

## Expertise

Purifics has been deploying its proprietary Ceramic Membrane Systems since 1993. Our installed global base (70+) provides unmatched Experience and Leadership in ceramic membrane system technology for Municipal and Industrial applications to Filter, Destroy and Recover (FDR) contaminants in water and other fluids.

Purifics' Experience and Leadership in ceramic membrane technology has let to unique innovations:

1. That Inhibit Fouling
2. Sustained High Flux Rates
3. Continuous Online Duty
4. Marker Based DIT
5. Enhanced Capability, Robustness, Efficiency & Durability
6. Eliminate or Reduce Chemicals

## Concentrated Sweep Flocc

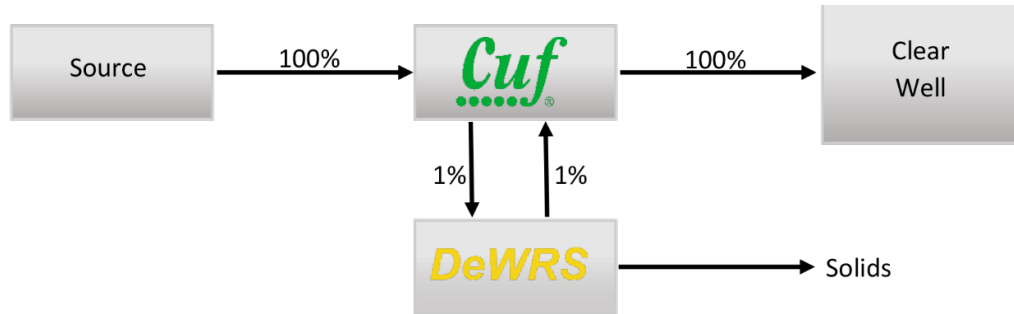
**Cuf** enables Concentrated Sweep Flocc to reduce coagulated demand by 60% over conventional charge neutralization and eliminates the need for Jar Testing and Zeta Potential dependence.





## Process Description

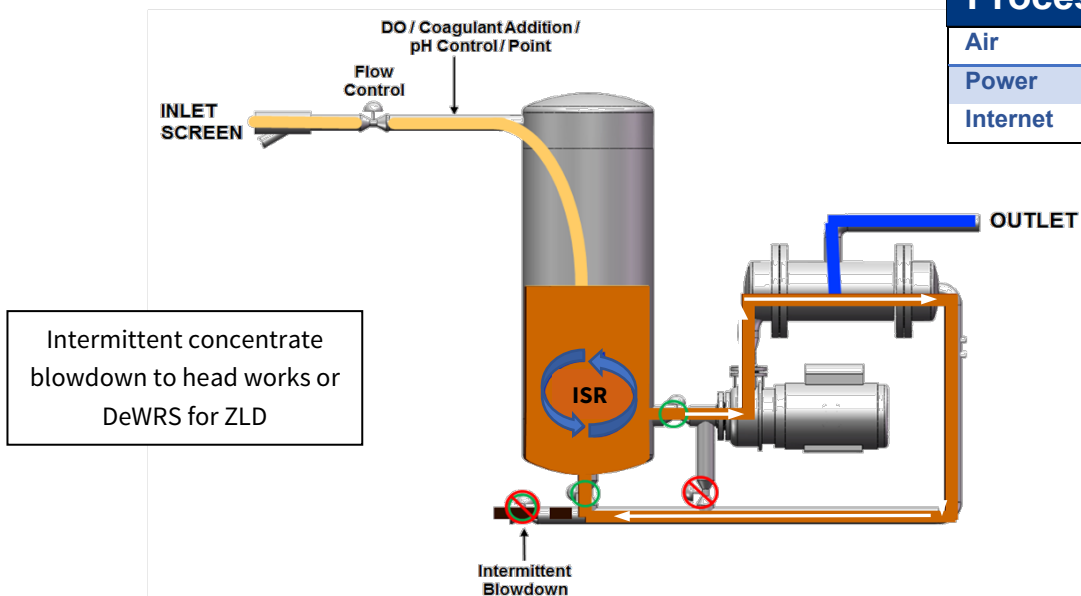
Raw water is screened for “frogs and logs” and processed in a crossflow arrangement, TMP is modulated in the **Cuf** to maintain constant flux over the performance range to ensure that flow rate requirements are achieved. The membrane module is frequently subjected to a dynamic shock to self-clean the membranes which inhibits fouling, allowing continuous online duty (~99%).



A concentrate blow down is sent to a DeWRS (DeWatering Recovery System) where a 20% solid is achieved without the need for chemical or labor.

**Cuf** is not Trans-Membrane Pressure (TMP) limited like conventional membrane processes. **Cuf** is unique and runs at a constant flux and the TMP is modulated to maintain the desired constant flux. This means that the flux in a **Cuf** process is independent of the fluid turbidity or temperature and the plant is not de-rated as the fluid temperature drops. This means that a **Cuf** process can respond to changes in viscosity, load and demand and is only limited by the installed TMP pump’s capability.

## Process Flow



Process Utilities	
Air	100psig
Power	480V 3 Phase
Internet	High Speed Static IP

In certain applications dissolved oxygen or a common coagulant is injected to oxidize metals or agglomerate or DOC. These reactions occur in the ISR (In-Situ Reactor). No upstream coagulation basins or clarifiers pretreatment is required, just the **Cuf** platform.





## Dynamic Shock

Purifics' proprietary Dynamic Shock process self-cleans the **Cuf** membrane in a continuous online operation. The shock is generated and travels through the water (no mass transfer), the membrane, and the module to drive foulants off the membrane surface.

## Remote Access & Control

**Cuf** utilizes a secure, cloud based VPN for remote control. This allows Remote Monitoring, programming/SCADA updates and remote technical support. The connection allows the **Cuf** to automatically message pertinent plant personnel in the event of a fault. The cloud based VPN requires any type of internet access including a mobile hotspot and does not require any programming.

## Duplex & Redundancy System Options

For system design and regulatory requirement purposes to retain capacity in the event of an upset, **Cuf** systems are available in a Duplex or Dual Module (DM) platforms and expanded capability.

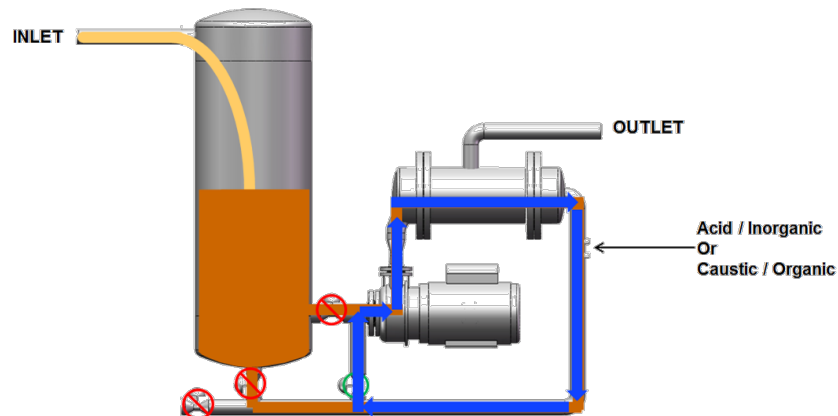
## Ratings & Certifications Available

- LT2ESWTR Compliant
- ASME B31.1 & 31.3
- NSF/ANSI 61
- Class I Div 2

## Regulatory Compliance

Regulatory Compliance in Multiple Jurisdictions since 2013 with the largest installed base of ceramic drinking water plants in North America.

## TMP Maintenance



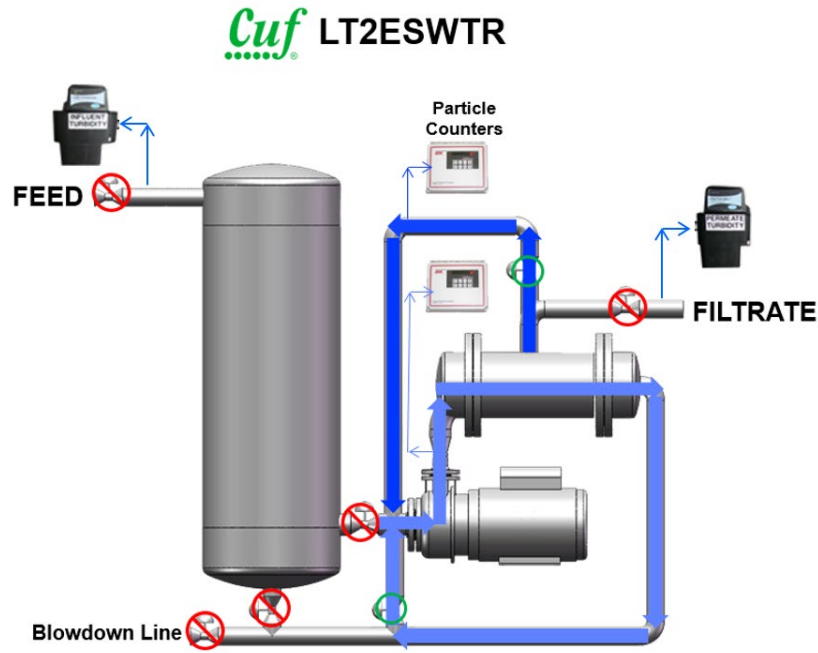
There is no Clean-In-Place (CIP) or backwash with the **Cuf** process. Over time or extended shut down or an upset event the TMP may increase. When this occurs an automated TMP Maintenance Rinse Cycle (chemical rinse) is activated and the concentrate recirculation loop (in blue) is isolated from the process, the Loop pump recirculates high crossflow, the temperature may be raised, and the pH shift chemical is injected. Acid is used for inorganic, and caustic is used for organic fouling. The combination of heat, crossflow velocity and pH shift are used to scour and dissolve residual foulants from the membrane. The TMP maintenance fluid is discharged through the blowdown line. When this 30 minute cycle is complete, full TMP recovery is achieved and the system is brought back online.





## LT2ESWTR Compliance for Membrane Integrity Verification

LT2ESWTR “Long Term 2 Enhanced Surface Water Treatment Rule” identifies the requirements for log removal of Cryptosporidium and the verification method to ensure the membrane integrity. This is achieved in the **Cuf** process by the following procedure.



Full details on **Cuf** LT2ESWTR compliance is provided in Document DOC2040 (LT2ESWTR Compliance & Verification).

## Highest Capacity Membrane Modules in the World





## Modular Platform Capacity

**Cuf** is available in different size platforms with single “M” or double “DM” modules to meet your process and capacity requirements. Detailed Platform Specifications Sheets are available in the “Downloads” section at [www.Purifics.com](http://www.Purifics.com). A **Cuf** Sizing and Application document is available upon request.

### **Cuf** Platforms



Module *	Nominal Capacity (MGD)		L x W x H
	Surface Water	Groundwater	
M16	0.1		10' x 2.5' x 6'
DM24	0.5	1	15' x 6' x 8'
DM36	1	2	22' x 8' x 10'
DM54	2	4	28' x 12' x 12'

\* DM Signifies Dual Module System. All DM Platforms can be supplied as M platforms only and be expanded to DM at future date.

## **Cuf** Membrane; Elegant but Tough

Purifics patented & patent pending SiC membrane is a unique 5th generation technology providing unmatched performance, efficiency, strength, durability, flux and anti-fouling properties. Once installed the membrane is **NEVER** removed or never sees the light of day again during its operational lifetime.



## Why **Cuf** - Features & Benefits





- ✓ The Platform is the Plant
- ✓ Zero Liquid Discharge
- ✓ 250 GFD on Surface Water
- ✓ Multi-Contaminant Removal Capacity
- ✓ Lowest O&M Cost Structure
- ✓ Fully Automated
- ✓ >99% On-Line Duty
- ✓ Continuous Self Cleaning
- ✓ ANSI 61 Compliant
- ✓ LT2ESWTR Compliant
- ✓ Reduced Complexity
- ✓ > 25 Year Membrane Life
- ✓ 50% Less Coagulant
- ✓ In-Situ Concentrated Sweep Flocc
- ✓ Low-Cost Marker Based DIT
- ✓ Twice the DOC Removal
- ✓ Best Warranty
- ✓ Constant Flux Capability
- ✓ Allows Free Chlorine Use
- ✓ Reduces Cl<sub>2</sub> Demand
- ✓ 5.7 LRV Approval
- ✓ THM & HAA Compliance
- ✓ All Filtrate to Distribution
- ✓ Only Level 2 Operator Required
- ✓ Continuous Flow
- ✓ 99.99% Feed Water Recovery
- ✓ Accepts Feed Pressure 0-150 psi
- ✓ Most Hydrophilic Membrane (SiC)
- ✓ Exceptional Cold-Water Performance
- ✓ Lower TMP & X Pressure
- ✓ Factory Acceptance & Review
- ✓ Factory Training Prior to Shipment
- ✓ Taste & Odor Removal
- ✓ In-Situ Coagulation
- ✓ In-Situ Oxidation
- ✓ In-Situ Reduction
- ✓ Virtually Indestructible
- ✓ Flexible Design Can Incorporate PAC
- ✓ 5th Generation 100% SiC Ceramic Membrane
- ✓ Eliminates Backwash Process
- ✓ Eliminates Backwash Tank
- ✓ Eliminates Clarifier
- ✓ Eliminates Flocculation or Polymer
- ✓ Eliminates Clean In Place (CIP)
- ✓ Eliminates Membrane Replacement
- ✓ Eliminates Filtrate Loss
- ✓ Eliminates Pre-Treatment
- ✓ Eliminates Chloramination
- ✓ Eliminates Permanganate
- ✓ Eliminates Temperature Constraints
- ✓ Eliminates Jar Testing
- ✓ Eliminates Bubble Decay Test
- ✓ Eliminates DIT Volumetric Concentration
- ✓ Eliminates Filter Press
- ✓ Eliminates 0.3 Micron Prefilter
- ✓ Eliminates Pressure Constraints
- ✓ Eliminates pH Constraints
- ✓ Eliminates Cleaning Constraints
- ✓ Eliminates Prorated Warranty
- ✓ Eliminates Irreparable Fouling
- ✓ Eliminates Coagulant Breakthrough
- ✓ Eliminates Onsite Fabrication
- ✓ Eliminates Continuous Operator Adjustments
- ✓ Eliminates Composite bigger  $\alpha$  Alumina Ceramic
- ✓ Eliminates Air Sparging
- ✓ Eliminates Intermittent or Batch Processing
- ✓ Eliminates Ion Exchange (SIX)
- ✓ Eliminates Flux De-Rating Due to Cold Water
- ✓ Eliminates Membrane End-of-Life
- ✓ Eliminates Dead-End
- ✓ Eliminates Just a Filter
- ✓ Eliminates Pinning
- ✓ Eliminates Charge Neutralization
- ✓ Eliminates Risk of Cross-Contamination
- ✓ Eliminates Complexity/Confusion
- ✓ Eliminates UV
- ✓ Eliminates Membrane Preservative
- ✓ 0-100% Turndown Capability

## Plant Tours

To fully appreciate the benefits of the *Cuf* process for your application, we highly recommend that you tour an existing installation that meets your requirements. Contact us to arrange a tour at your convenience.

