# SpiraSep

## Ultrafiltration Membrane Technology

TRISEP CORPORATION

www.trisep.com

# Evolution Of Membrane Formats

- Plate and Frame
- Tubular .5 - 1 inch diameter
- Hollow fine fibers
- Hollow fibers
- Spiral- Highest Economic and Hydraulic Efficiency has proven itself for over 30 years.

TRISEP CORPORATION

# Membrane Technology

## SpiraSep Ultrafiltration Membranes

TRISEP CORPORATION

# SpiraSep

***Immersible,***
***Oxidant Resistant***

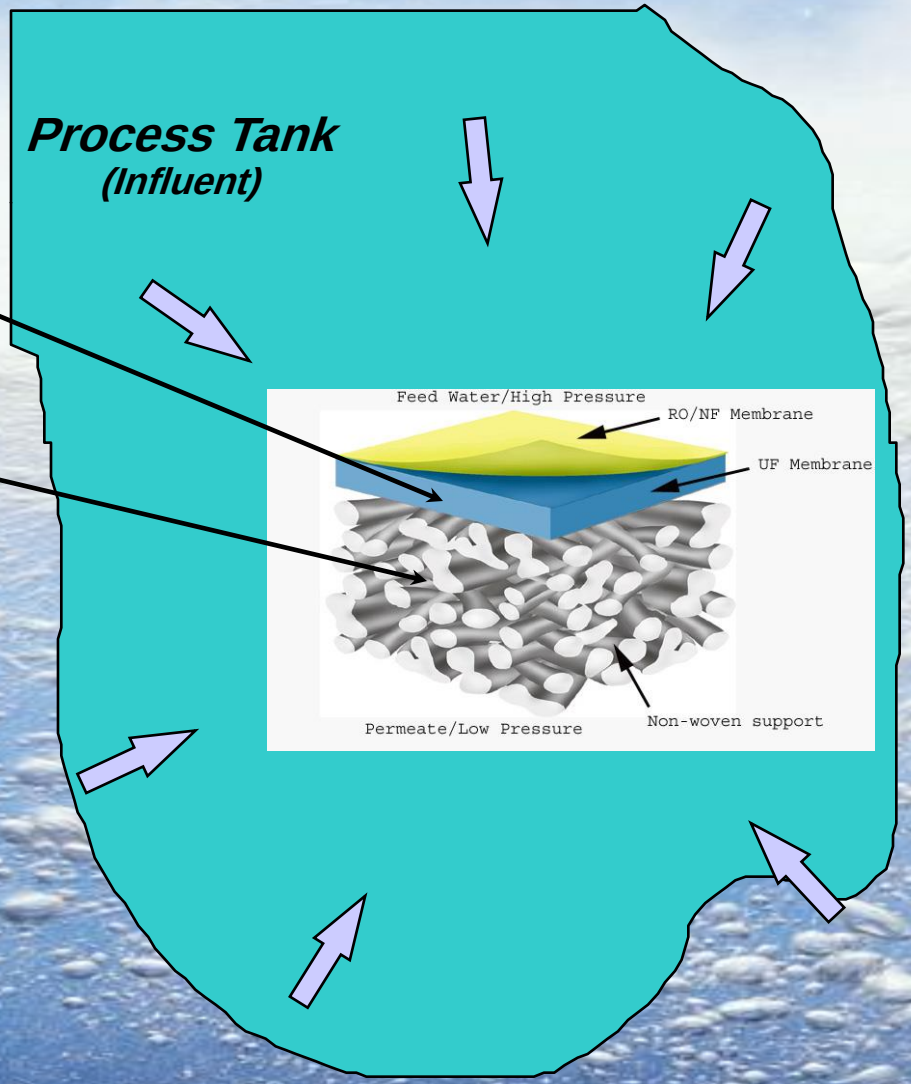
***Polysulfone Membrane***

***Membrane Support***

***Pore Size***
***0.05 micron***

***150K MWCO***

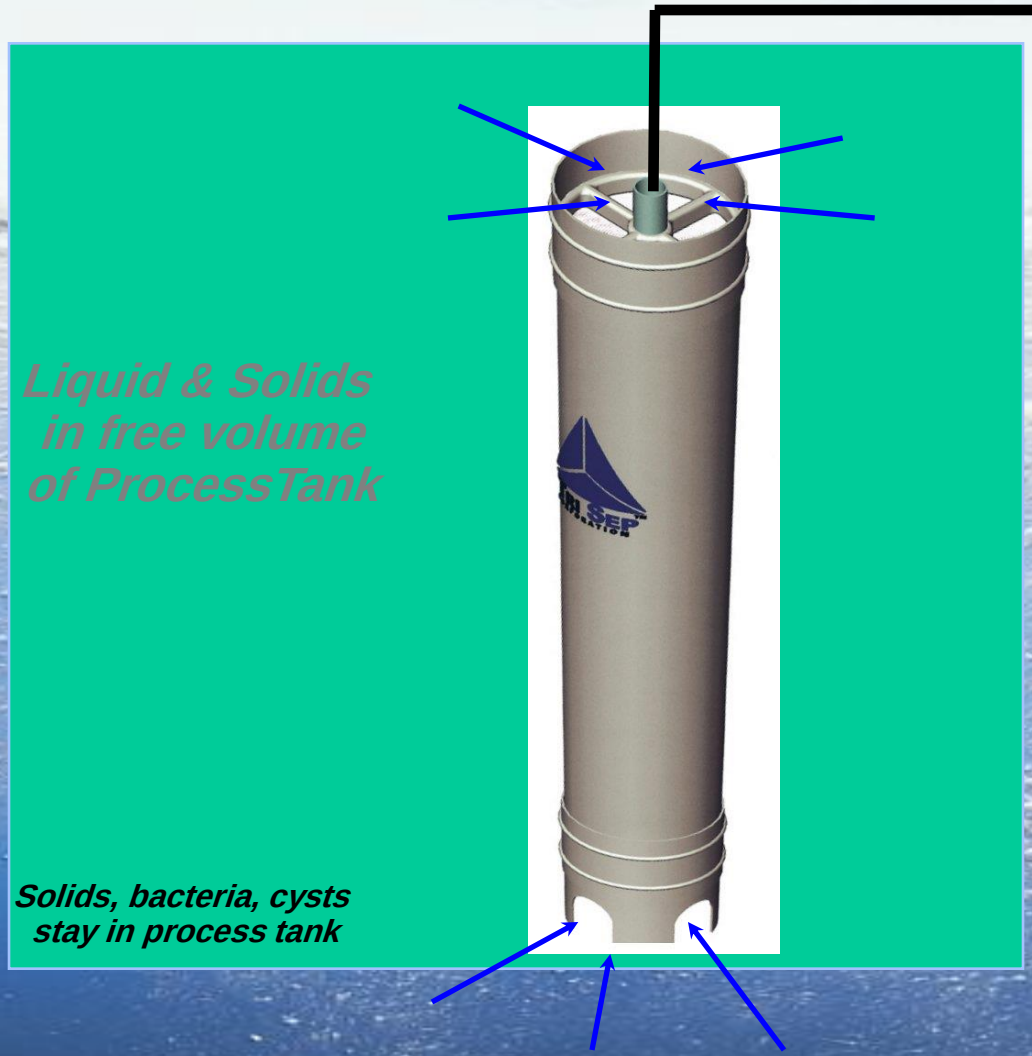
***Ultra Low Pressure***
***Operates at -2 psi to -5 psi when filtering and 3 psi on backwash***




TRISEP CORPORATION

# SpiraSep

## Immersible Spiral Membrane Element




-2 to -5 psi
suction
pressure

**Filtered Water**

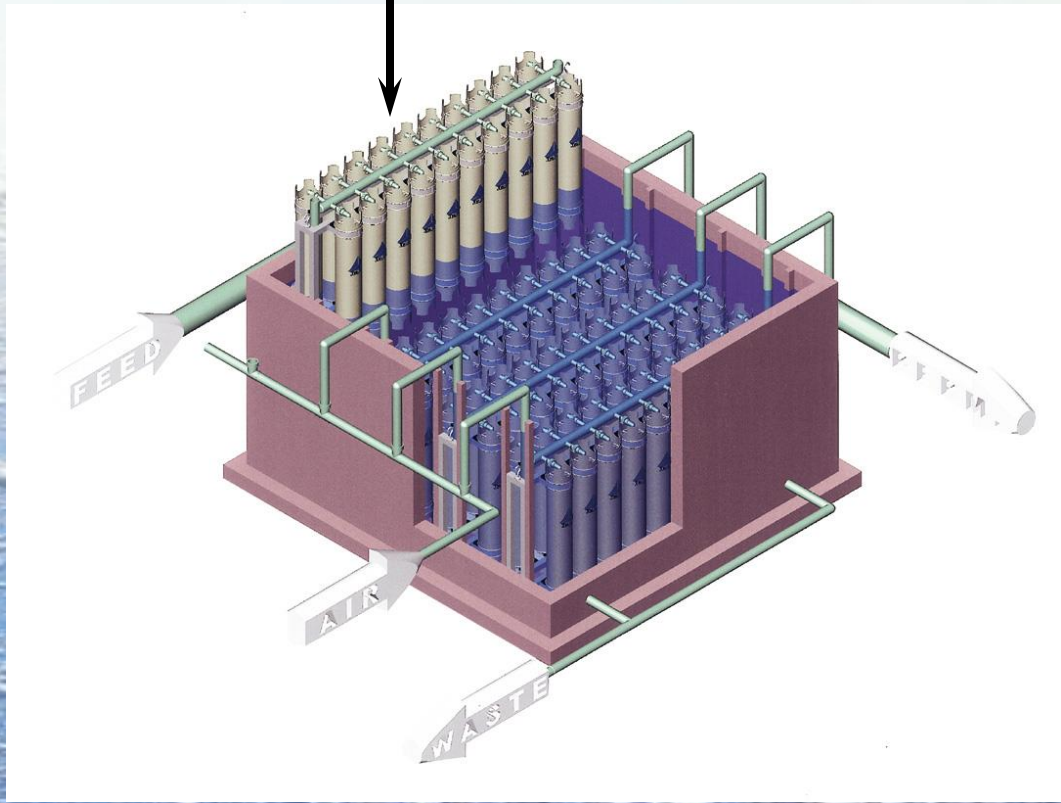
TRISEP CORPORATION

www.trisep.com

# SpiraSep Spiral Membrane

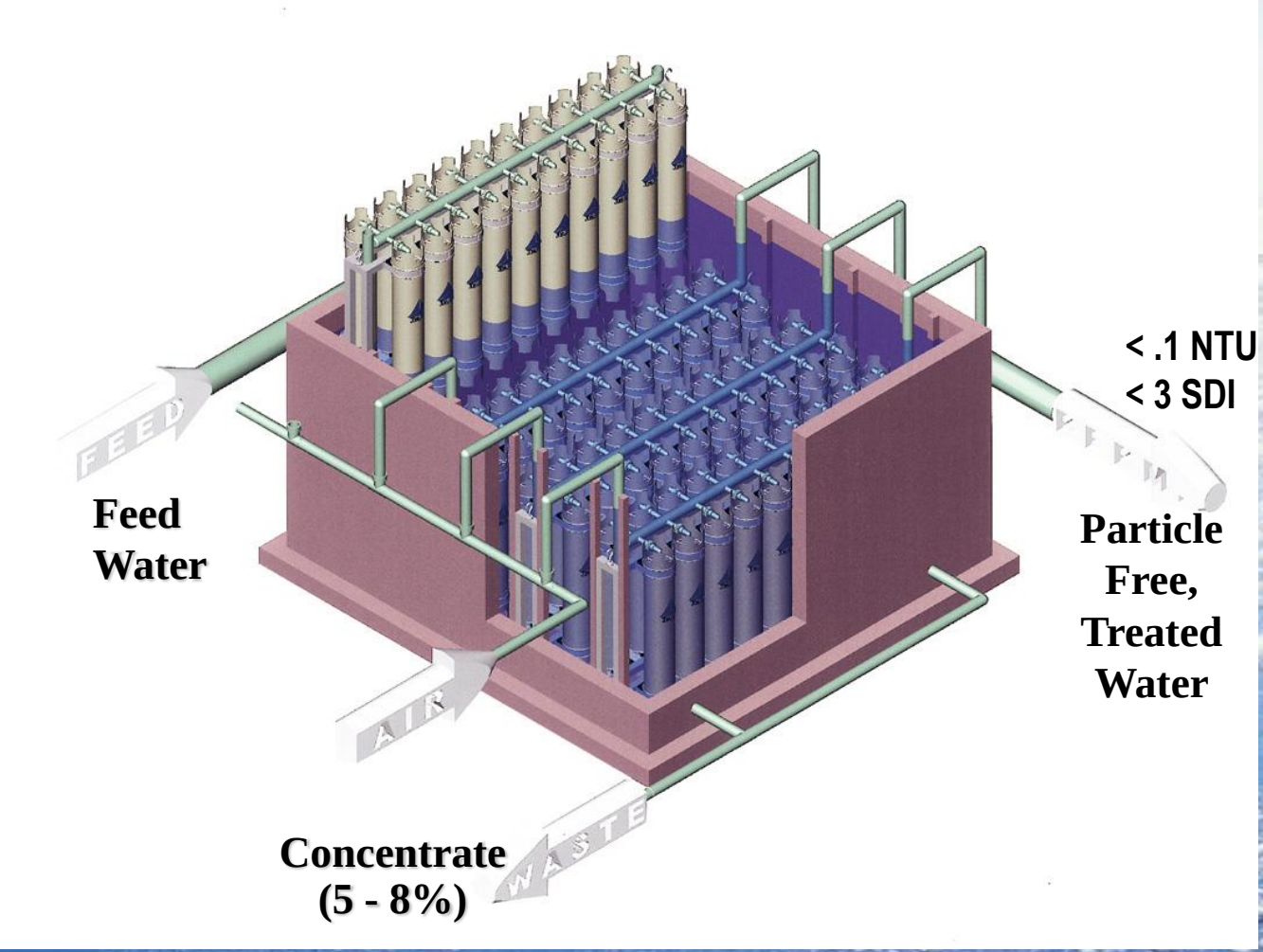
***160 sq. ft. per element***

***Rack***



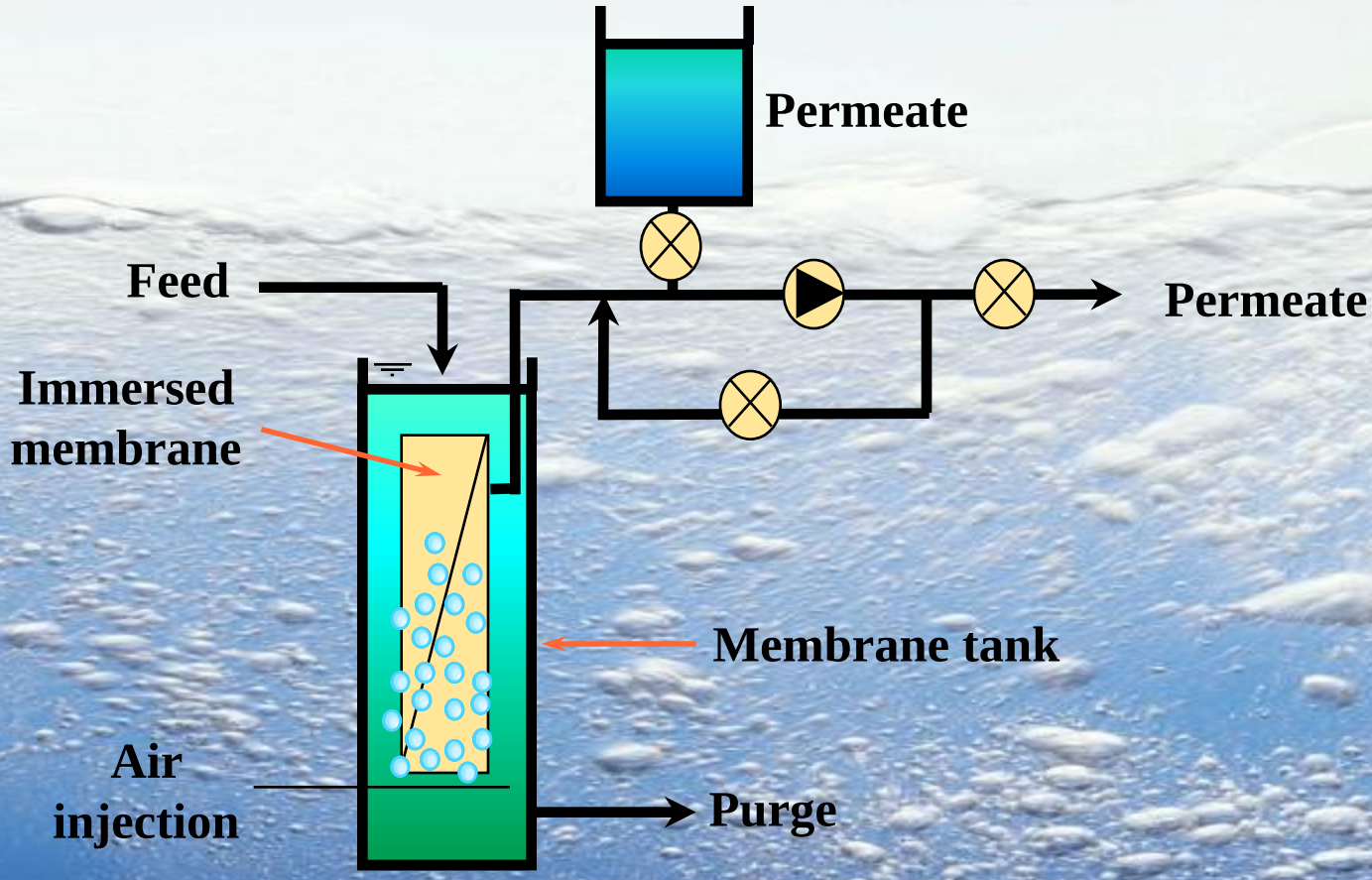

TRISEP CORPORATION

# SpiraSep Process




TRISEP CORPORATION

# Principles of Operation of SpiraSep Immersed Membranes




TRISEP CORPORATION

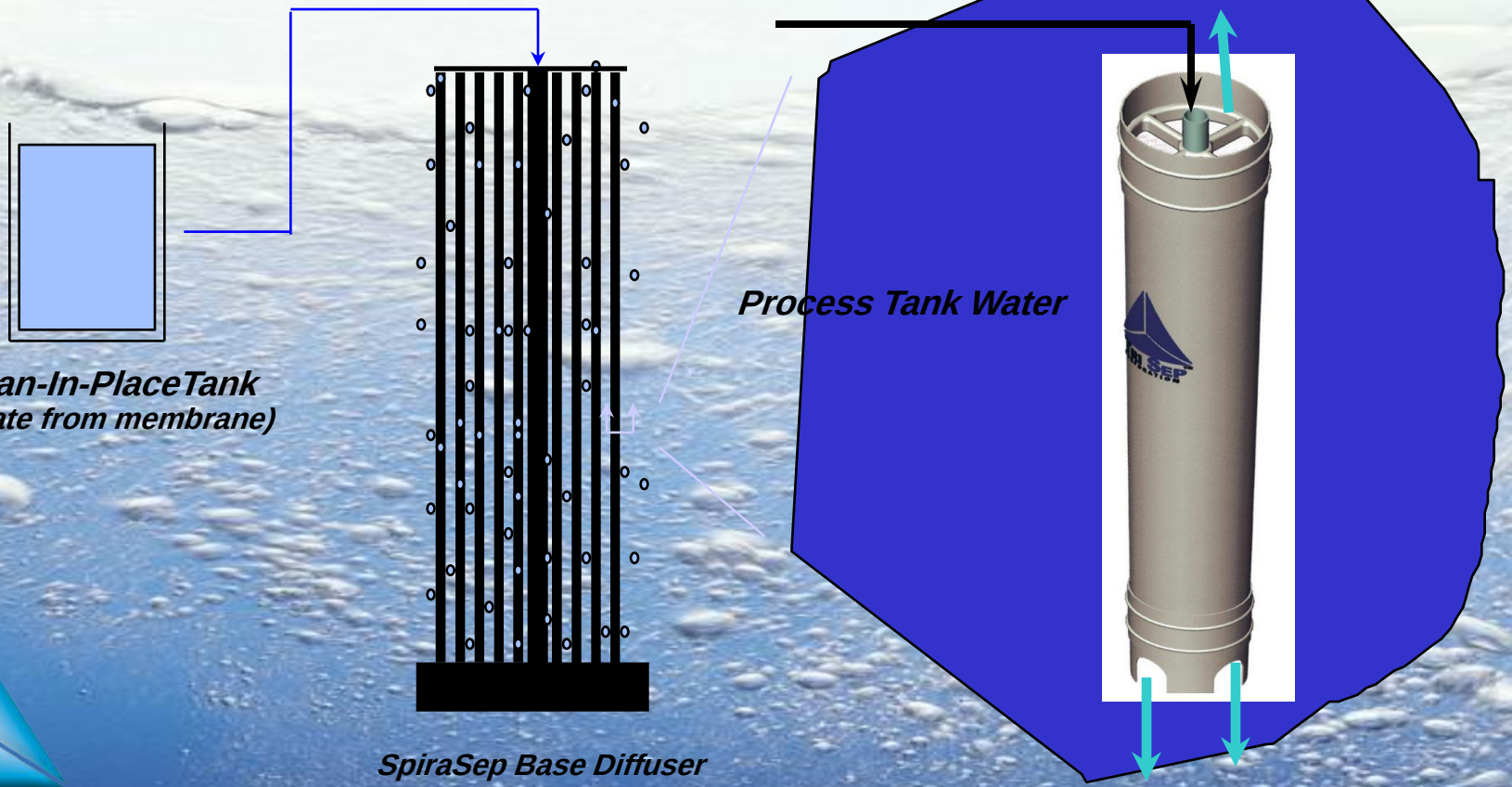
# Four mechanisms prevent fouling in SpiraSep

- **Automatic backpulse/backwash**
- **Air scouring**
- **Periodic chemical cleaning**
- **Hydrophilic, foulant resistant membrane chemistry**

TRISEP CORPORATION

# SpiraSep Backwash

***SpiraSep uses clean filtrate to backwash itself. A reverse flow from the CIP tank is fed to the permeate tube, cleaning from the inside out. Cleaning chemicals are optional and not always necessary.***

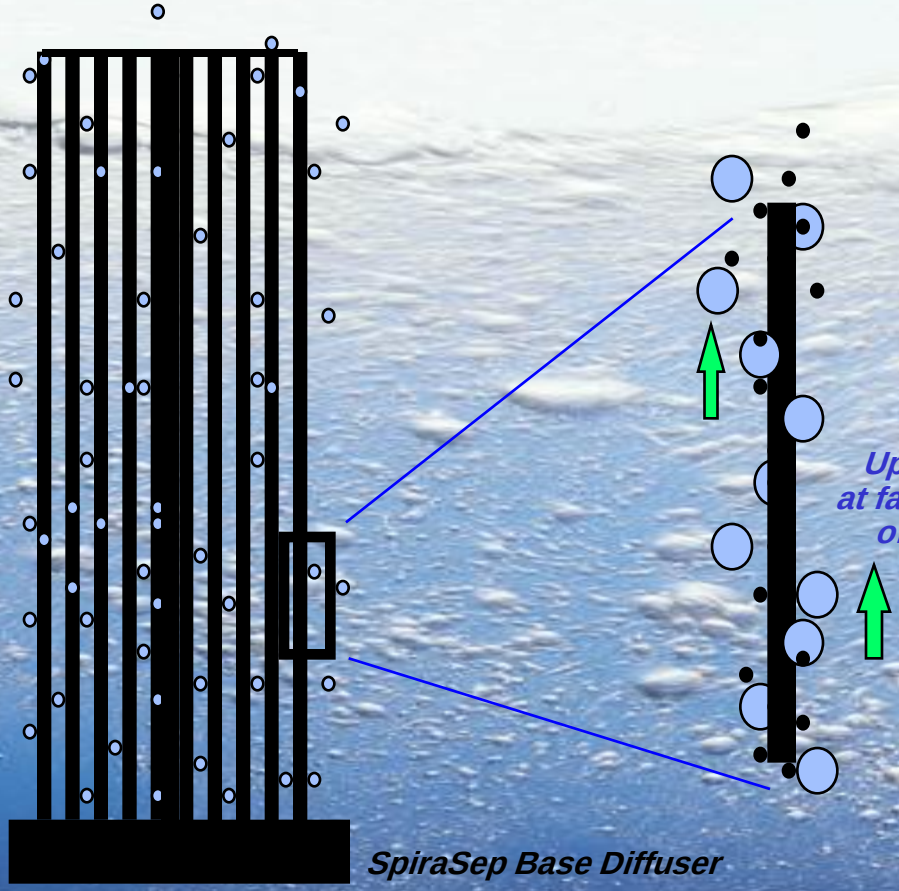



TRISEP CORPORATION

www.trisep.com

# SpiraSep Air Scour

***Membrane is kept free of solids build-up by the action of a rising solids/air/liquid stream at the face of the membrane. This rising stream produces a Cleaning Shear at the face of the membrane due to the airlift effect of the rising stream.***



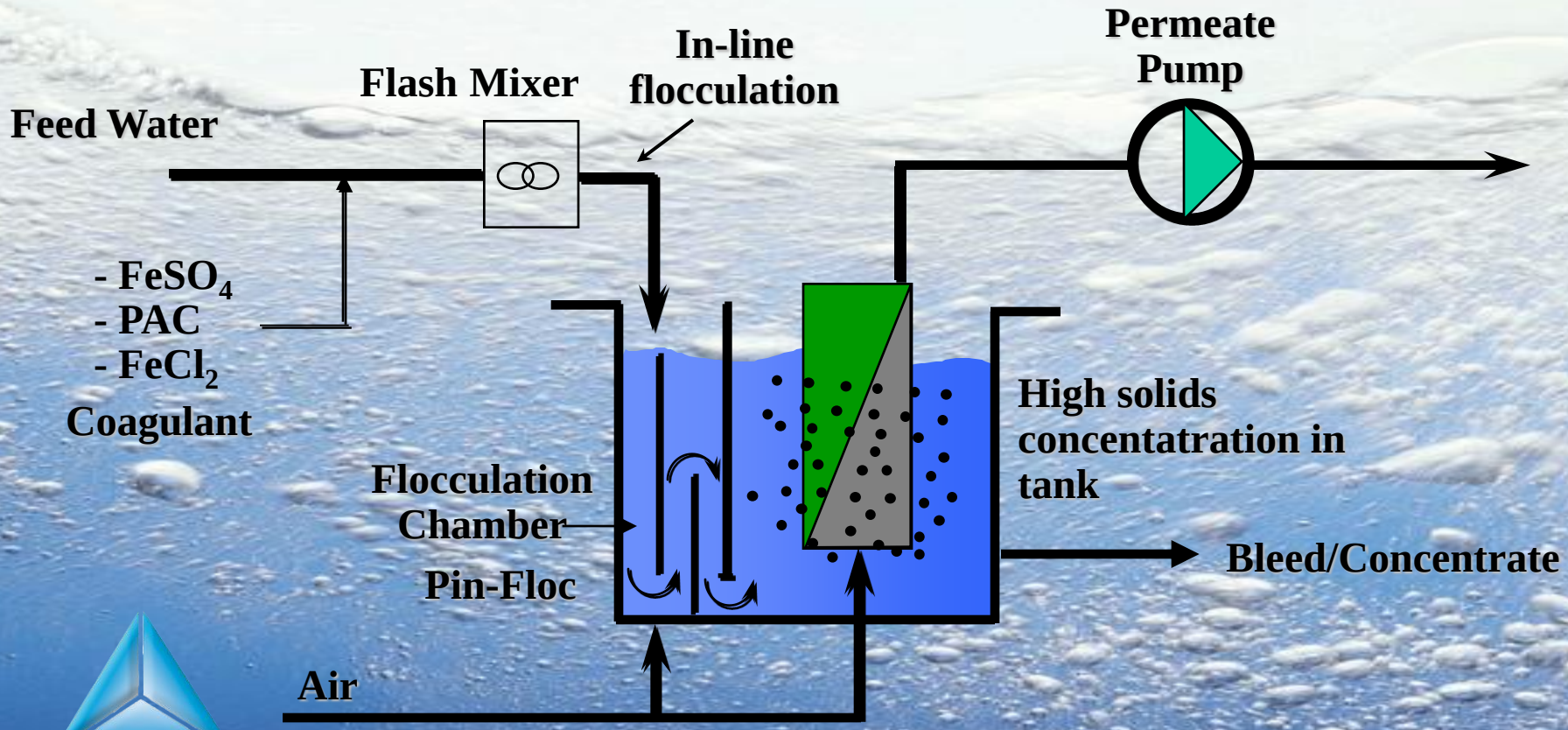
*Upward component of cleaning shear at face of membrane due to rising stream of air and solids from SpiraSep base*

*SpiraSep Base Diffuser*

TRISEP CORPORATION

# SpiraSep Enhanced Coagulation Process

Reduction of TOC, Color, Etc.




TRISEP CORPORATION

www.trisep.com

# Coagulation

- Settling is not required with SpiraSep Enhanced Coagulation systems. This reduces chemical costs and sludge production.
- Objective is to form a pin sized floc only larger than the membrane pore size.
- Typical residence time in the floc tank is between 2 to 5 minutes
- SpiraSep membranes able to directly handle high solids concentrations. Handling high solids allows us to dose higher coagulants and thus treat extreme water qualities
- Membrane compatible with all commonly used coagulants

TRISEP CORPORATION

# SpiraSep Advantages

***Successful Operation on Wastewater, Surface Water and Potable Water***

- Combines the ability to Backflush retained solids with the Hydraulic and Economic Efficiency of the Spiral
- Air Scour & Backpulsing minimize cleaning and achieve high permeation rates at low pressures
- Immersed directly in process fluid with pump suction drawing the permeate through the membrane

***High Quality Effluent***

- < 0.1 NTU
- < 3 SDI
- Reduction of TOC, Color and other species Via Enhanced Coagulation

TRISEP CORPORATION

# SpiraSep Advantages

***Energy Efficient***

- Very low Trans Membrane Pressure Operation
- No recirculation pump
- No backwash pump

***Lower Capital Costs***

- Spiral format reduces the cost of the membrane component
- Rack and Manifold designs less complicated

***Low O&M Costs***

- Lower membrane replacement costs due to spiral format economics and long life (no fibers to break)
- Minimum pumping costs
- Infrequent recovery cleaning
- Minimum waste

TRISEP CORPORATION

# SpiraSep Advantages

***Low Installation Costs***

- Small Footprint due to high membrane packing density
- Modular, Skid-mounted Designs

***Low Waste Volume***

- Minimum reject
- Low recovery cleaning frequency Successful Operation on Wastewater, Surface Water and Potable Water

***Membrane Element Components Can Be Independently Selected***

- Feed spacer, support material and permeate carrier can be chosen to accommodate each application
- High temperature service up to 150 deg. F.
- A range of feed spacer / packing density combinations to optimize varying feedwater solids concentrations

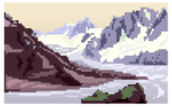
TRISEP CORPORATION

TRISEP CORPORATION

# SpiraSep

Ultrafiltration Membrane Technology

## PURE WATER APPLICATIONS



SURFACE WATER
SEAWATER
MUNICIPAL WATER

SpiraSep UF
PRIMARY FILTRATION

< 0.2 NTU
< 3 SDI

RO → IX

Boiler Feedwater
Process Water
Cooling Tower
Potable Water

***Reuse***

## WASTEWATER APPLICATIONS

MUNICIPAL
OR INDUSTRIAL
WASTEWATER

Activated Sludge

Secondary Clarifier

SpiraSep UF
TERTIARY FILTRATION

< 0.2 NTU
< 3 SDI

*Discharge*

SpiraSep UF
BioSepMEMBRANE BIOREACTOR

COD Reduced > 90%
BOD Reduced > 98%

< 0.2 NTU
< 3 SDI

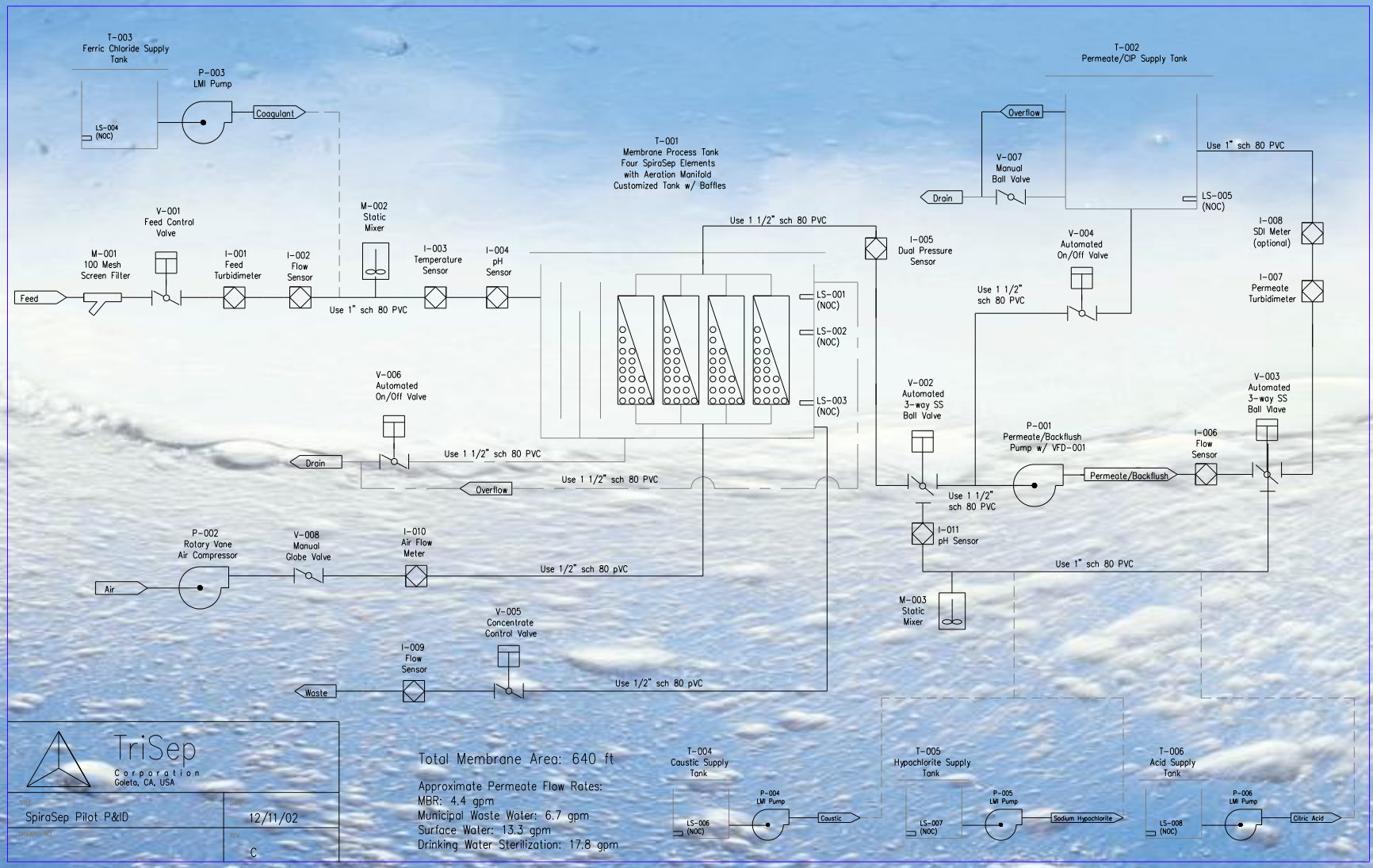
SRT to 70 days
MLVSS to 15,000 ppm

TRISEP CORPORATION

www.trisep.com

TRISEP CORPORATION

www.trisep.com




TRISEP CORPORATION