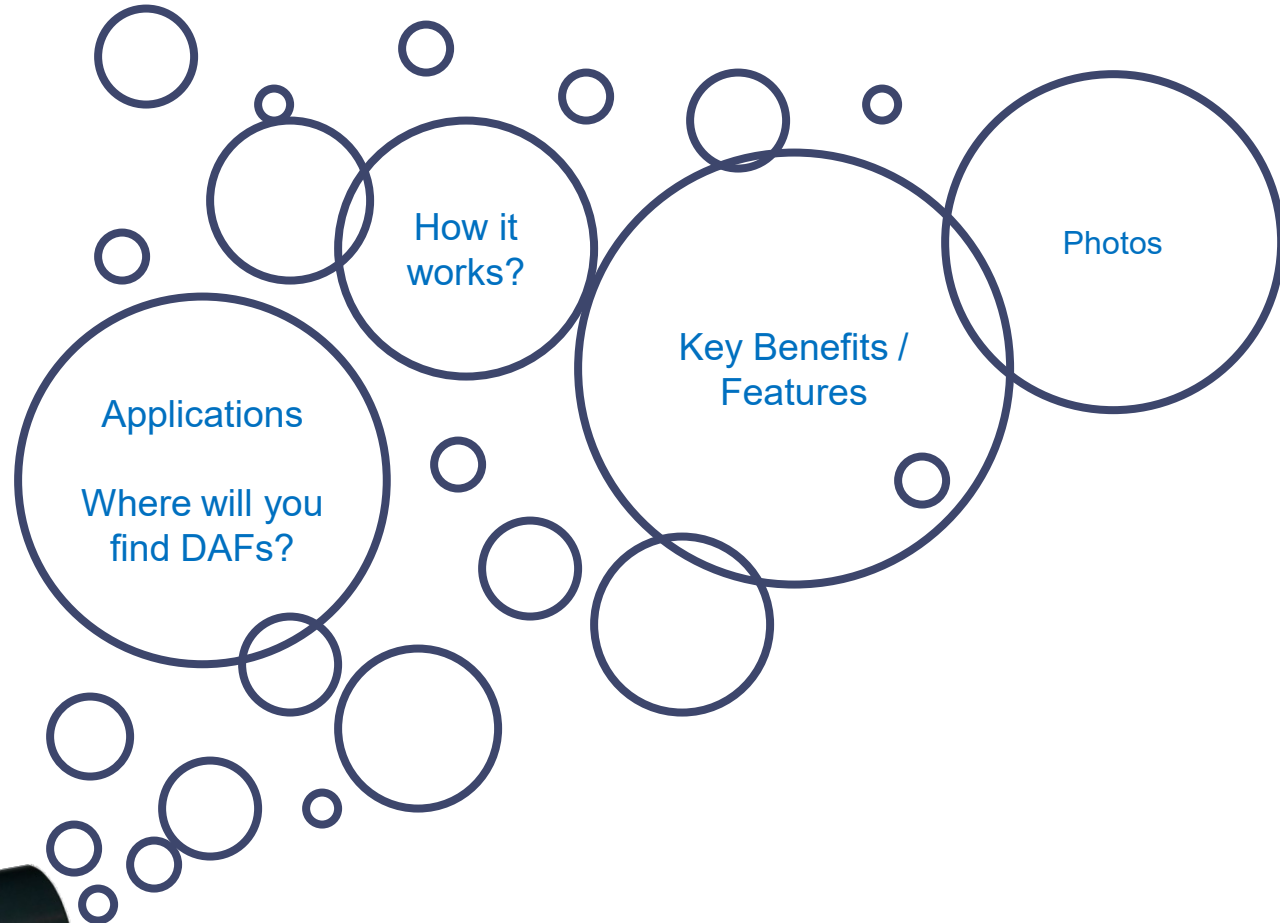


Dissolved Air Flotation (DAF) Applications for Drinking and Wastewater Treatment



AquaDAF

This Presentation



Applications for Dissolved Air Flotation

Low turbidity

High TOC, colored waters

Algae removal

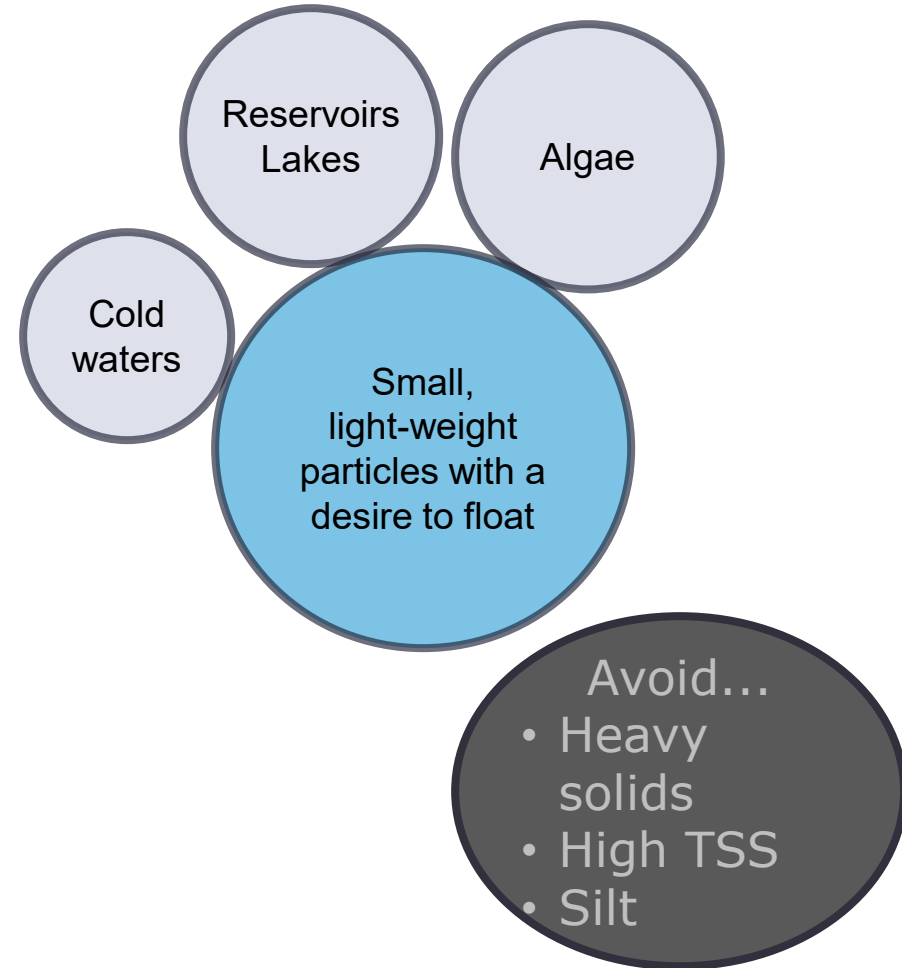
Membrane filtration pretreatment

Desalination pretreatment

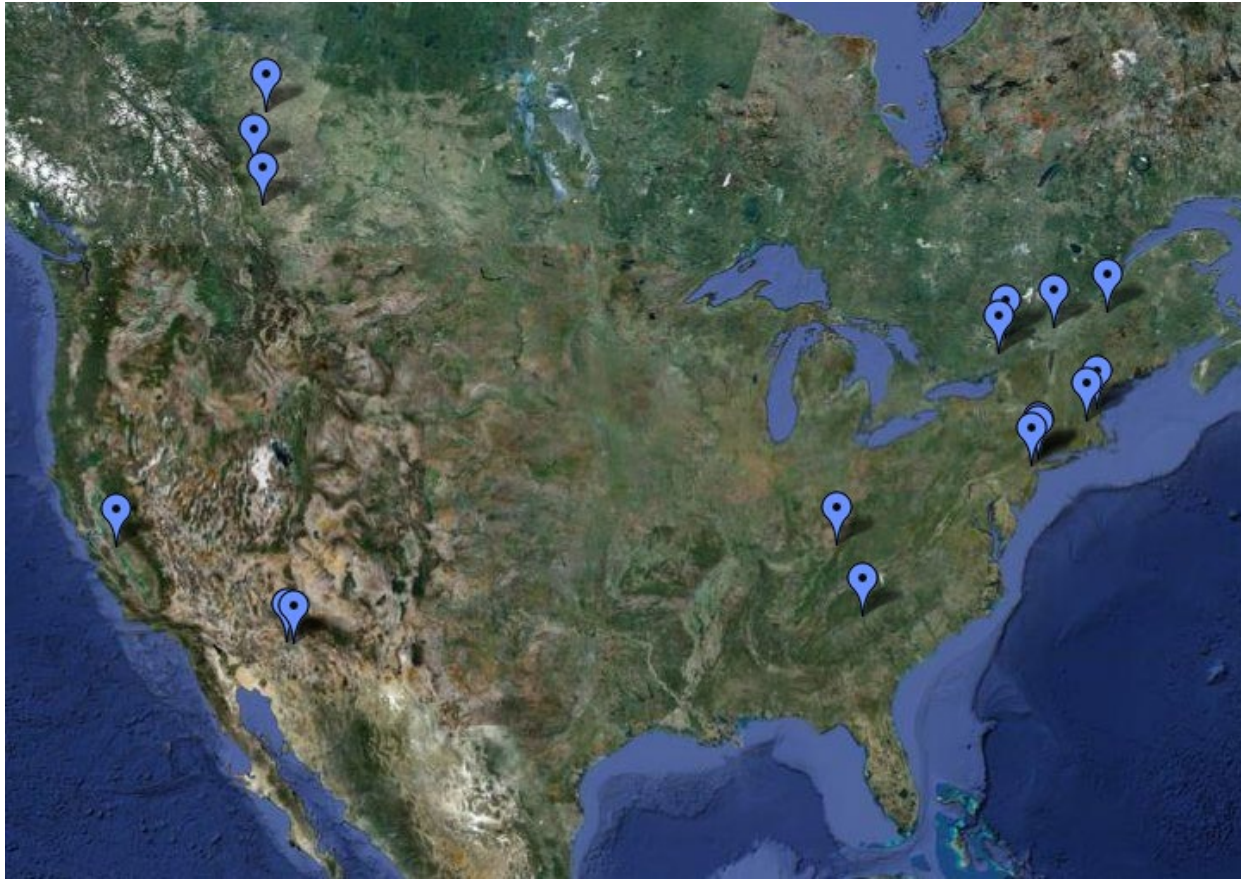
Retrofit expansions

Backwash Residuals

Tertiary Clarification



SUEZ North American Installations



Largest Plant

Haworth, NJ 208-MGD
(10 units – 16 gpm/ft²)

Applications

Drinking Water: 26

23 Standard Clarification
3 Membrane Pretreatment

Wastewater: 3

1 DW Membrane BWW
1 BAF BWW
1 Tertiary phos.

*Map not up to date

Operating Principles

The operating principles are similar to a conventional treatment process

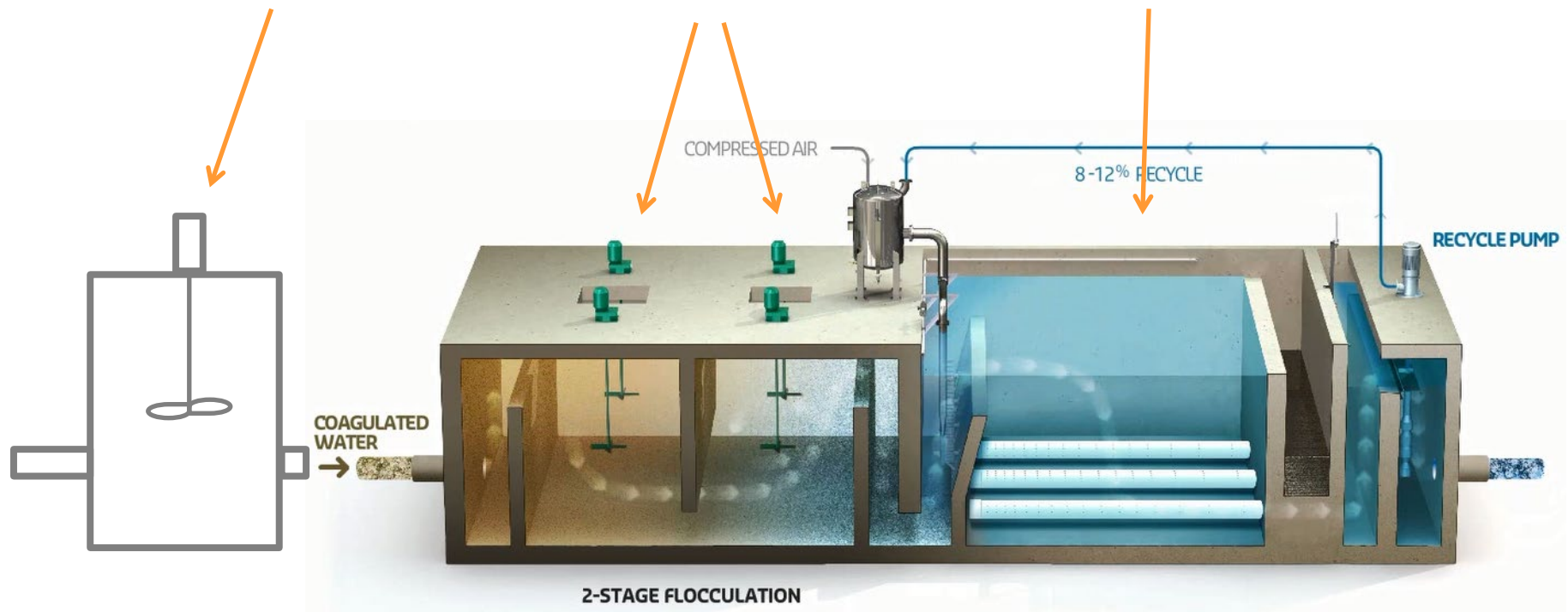
Coagulation



Flocculation



Separation



Coagulation and Flocculation System

Coagulation - The destabilization of colloidal particles via the neutralization of the particles surface charge

- Rapid mixer or static mixer
- Coagulant: typically Alum, Ferric, or PACl



Flocculation - The agglomeration of the destabilized particles into a larger floc

- Two stages mixing, typically mechanical mixers
- Polymer: Rarely required



Separation System

At the heart of a DAF is the recycle stream. Here, process air bubbles are produce, adhere to floc, and float to the surface clarifying the water

Recycle Pump



Saturation Tank



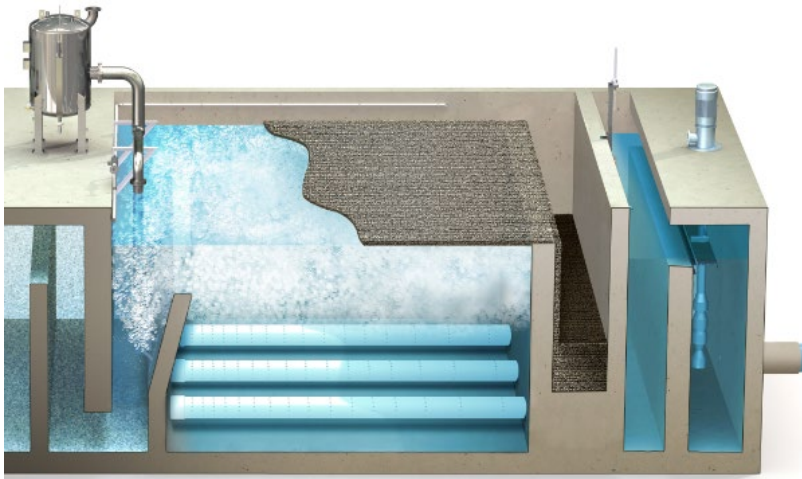
Bubble Bed



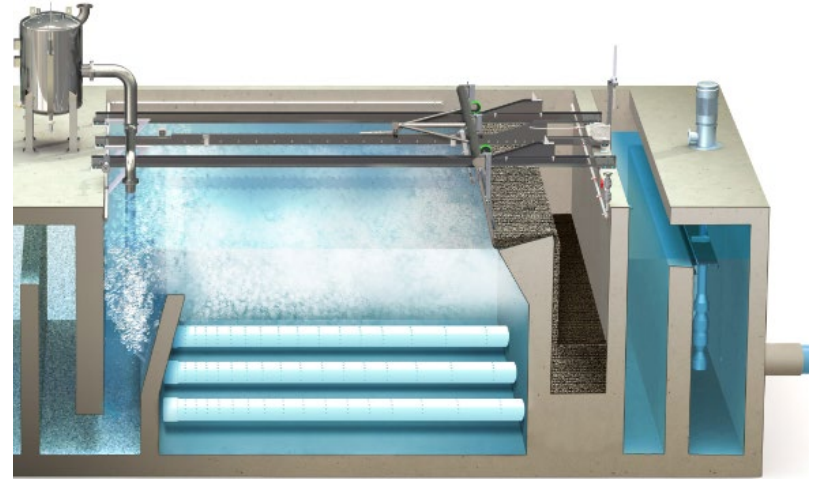
Collection and Sludge

Clarified water is collected at the bottom of the flotation zone using a specially designed collection system for high rate treatment.

The floated solids are periodically removed either hydraulically or mechanically using a scraper..



Hydraulic: the water level is raised until the sludge flows into the sludge trough



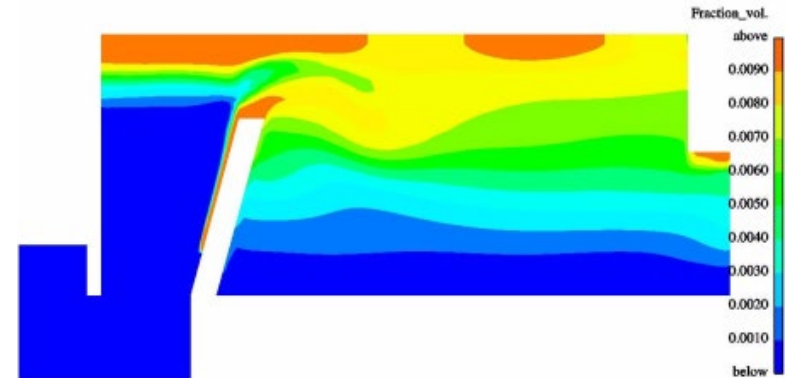
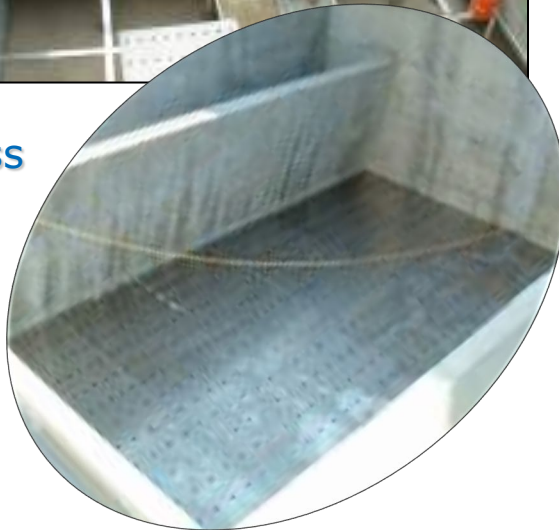
Mechanical: A scraper pushes the sludge into the sludge trough.

High Loading Rate

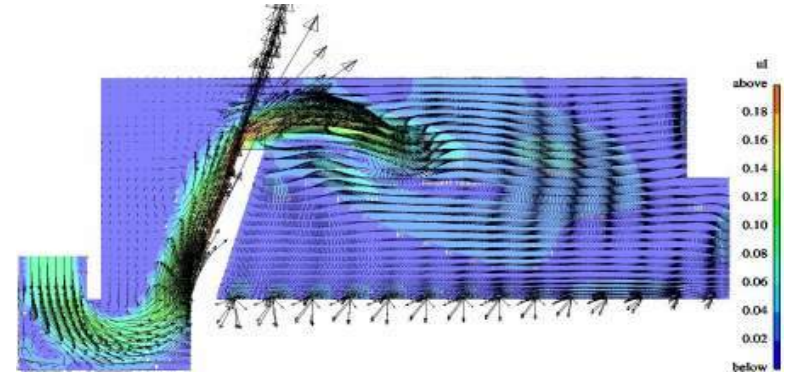
AquaDAF's high-rate is achieved in the special collection zone



Variable Headloss
+
Inclined baffle



The top CFD analysis shows bubble concentration, the bottom shows water velocity

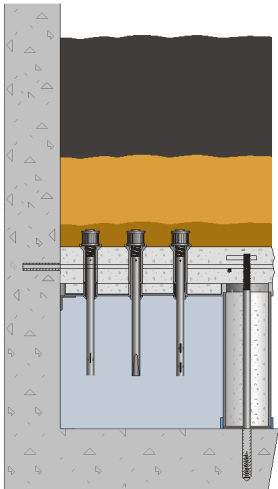


Key Benefits

1. Algae Removal
2. Phosphorus Removal
3. Membrane Pretreatment
4. High loading rate : small footprint
5. Package Units and Piloting
6. Experience

Key Feature: Algae removal

1. Algae can be difficult to settle. The particles are light and have a natural tendency to float.
2. Algae blooms can blind filters and cause short filter run times
3. Algae can causes taste and odor complaints



Haworth, NJ

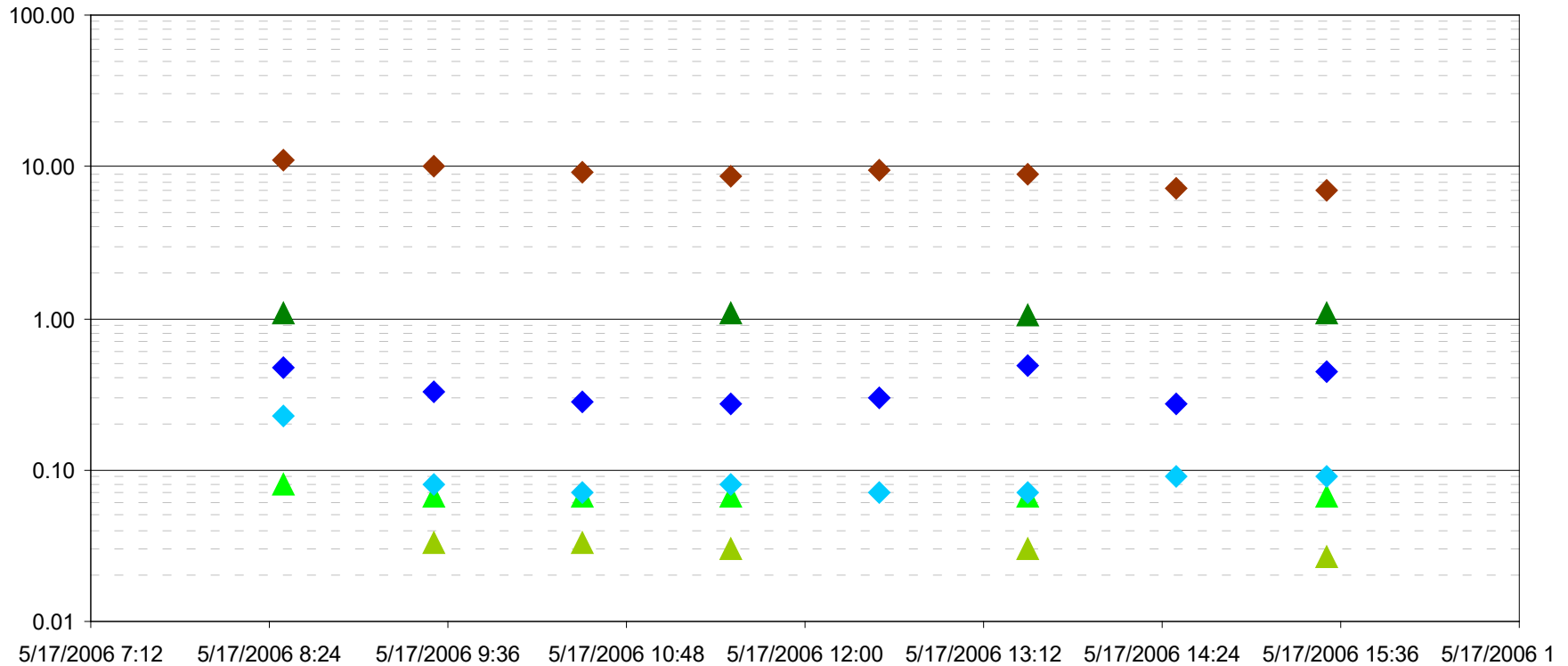
Increased filter run time from:
6-10 hrs → 48-72 hrs
Average 93% removal



Lake Deforest, NY

Increased filter run time from:
20-35 hrs → 60-90 hrs
Average 93% removal

Key Feature: Phosphorus removal



Settings:

Rise-rate: 12gpm/ft2 (104gpm)

Coagulant: FeCl3 (40ppm)

Floc Time: 11.3min (2 basins)

Recycle flow: 13gpm (12.5%)

Recycle pressure: 87psi

◆ Raw Turbidity

▲ DAF Ortho Phosphorous

▲ Raw Ortho Phosphorous

◆ Filter Turbidity

◆ DAF Turbidity

▲ Filter Ortho Phosphorous

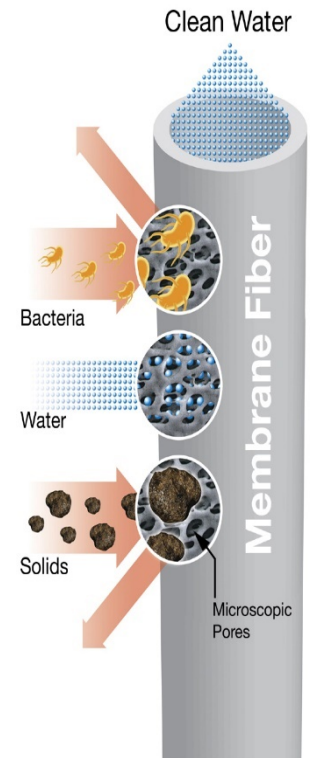
Key Feature: Membrane Pre-treatment

Pre-treating reduces the solids load on membranes
→ Fewer modules / higher net recovery

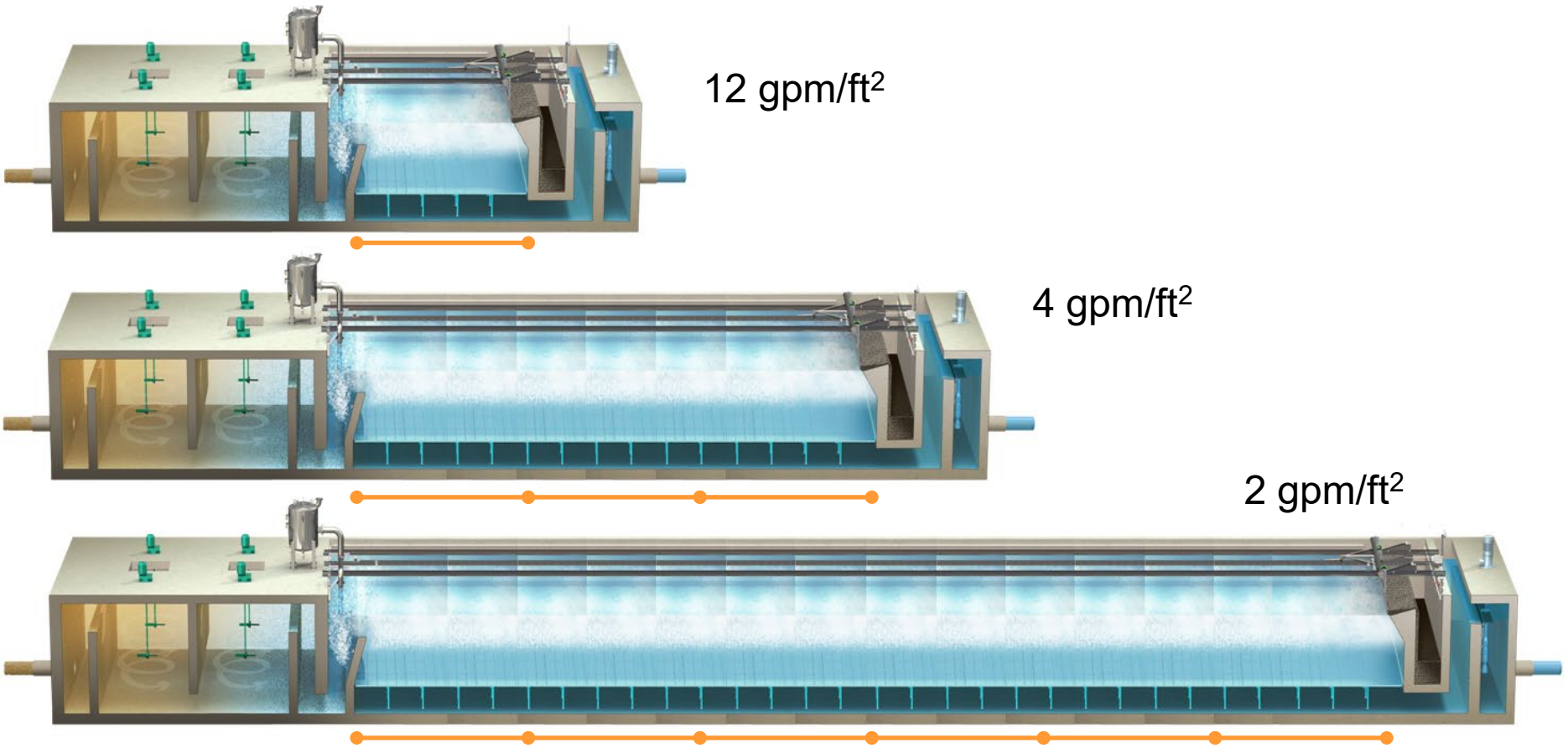
No polymer required
→ higher flux rates

No abrasive ballast
→ longer membrane life

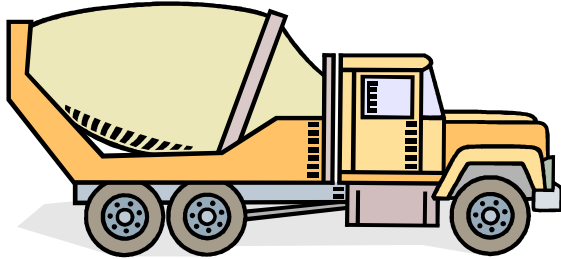
'Insurance'
→ Protect membranes



Key Feature: High-rate $\rightarrow$ smaller collection zone



Key Feature: Small footprint



Less concrete:

- Save material and install time



Less land:

- More expansion capacity
- Fits in limited available areas



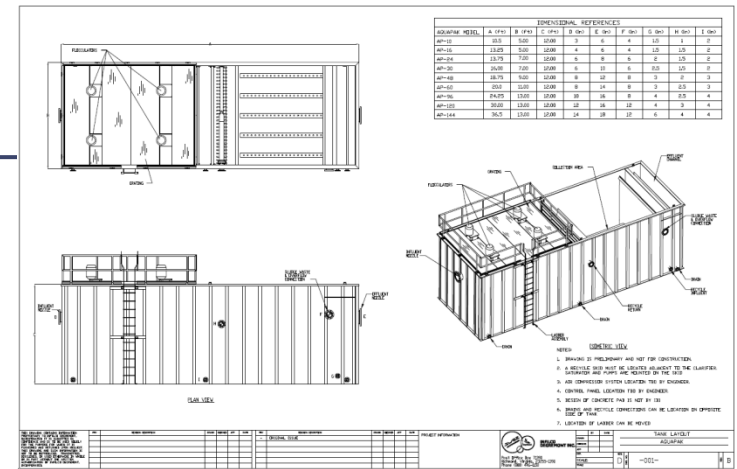
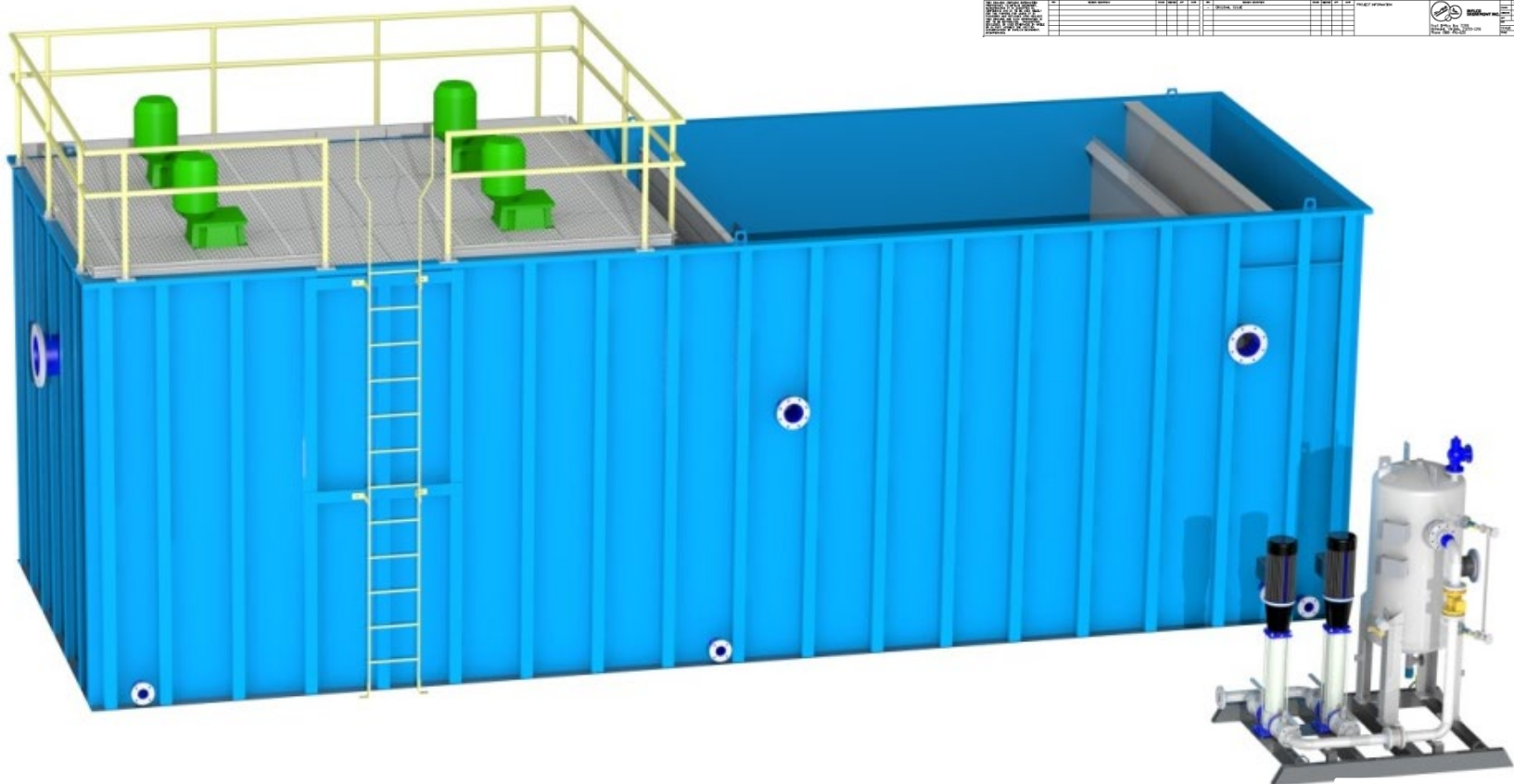
Smaller building:

- Save materials and O&M

Key Feature: Retrofit, Flexible Layouts



Available in size from 0.1 - 2.5 MGD



AquaDAF

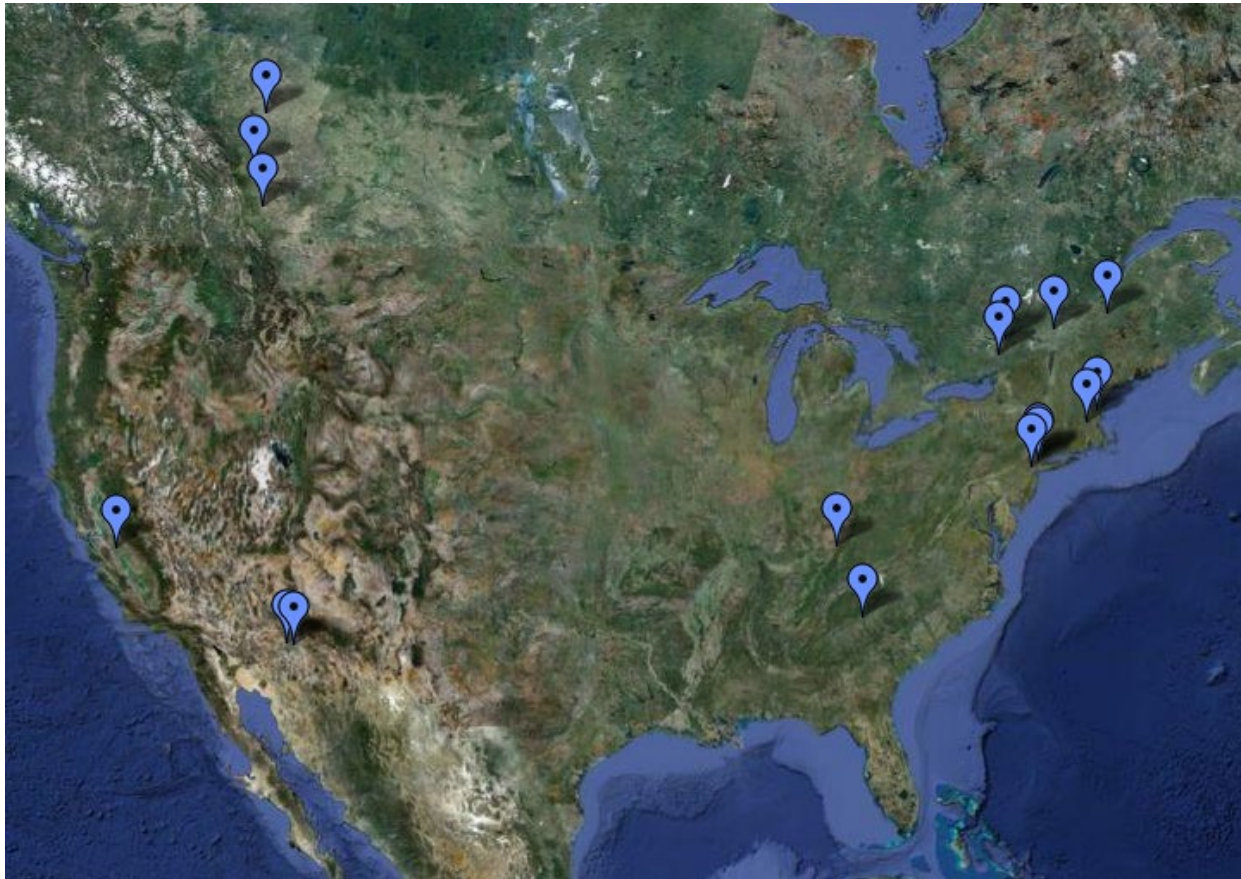
Key Feature: Package Plants



Key Feature: Piloting



Key Feature: 29 North American Installations



*Map not up to date

Largest Plant

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Applications

Drinking Water: 26

23 Standard Clarification
3 Membrane Pretreatment

Wastewater: 3

1 DW Membrane BWW
1 BAF BWW
1 Tertiary phos.

Key Benefits:

- | | |
|--|---|
| 1. Algae Removal | >85% algae removal
Reduce taste and odor |
| 2. Phosphorus Removal | <0.2 mg/L TP |
| 3. Membrane Pretreatment | No polymer
Protect membranes |
| 4. High loading rate : small footprint | Save material
Smaller Building |
| 5. Package Units and Piloting | 0.1 – 2.5 MGD / Unit
Piloting experts |
| 6. Experience | >100 DAF units
400-MGD N.A Capacity |

Lake Deforest, NY

20-MGD, 2 units, Drinking Water



Scottsdale, AZ

25-MGD, 2 units, Membrane Pretreatment



South San Joaquin, CA

46-MGD, 4 units, Membrane Pretreatment



Haworth, NJ

208-MGD, 10 units, Drinking Water



Haworth, NJ

208-MGD, 10 units, Drinking Water

