BLUE WATER TECHNOLOGIES

Filtration: Centra-flo™

Nutrient Removal: Blue PRO®

Blue NITE™

BLUE WATER TECHNOLOGIES

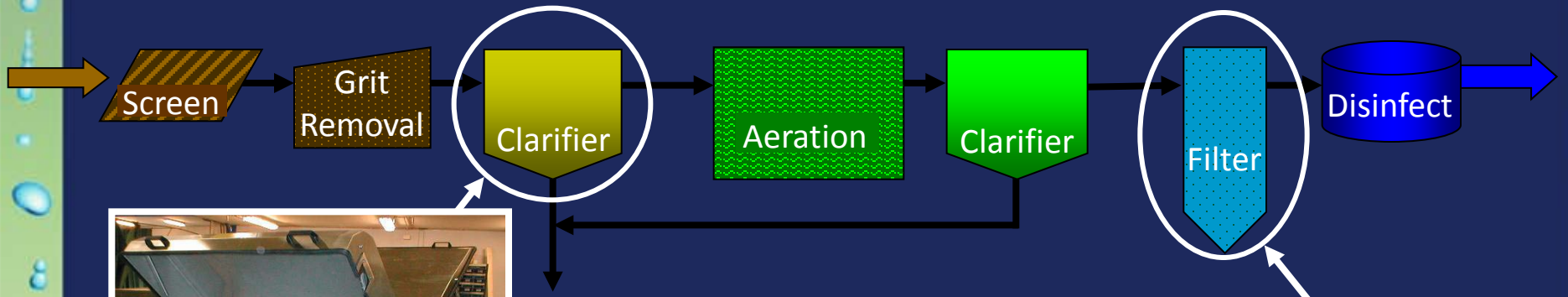
Blue Water Company Overview

- Founded in 2003 with technology transfer from the University of Idaho.
- Commercialized and installed first nutrient removal solution in 2006.
- In 2007 added primary treatment solution, installed first unit in 2008.
- Installs in 24 U.S. States and 5 countries.

- Headquartered in Hayden, Idaho.
- Nationwide manufacturers rep network.
- International license program.

BLUE WATER TECHNOLOGIES

Efficient and Cost Conscious



- Patented primary treatment
- Only alternative to clarifiers
- 1/10 the footprint = lower capital cost
- Highest solids removal with no chemicals required
- Eliminates pretreatment steps
- Generates high BTU fuel source

- Leader in performance
- Dramatic capital and operating cost advantage over membranes
- Simple design with no moving parts.
- 6 U.S. Patents

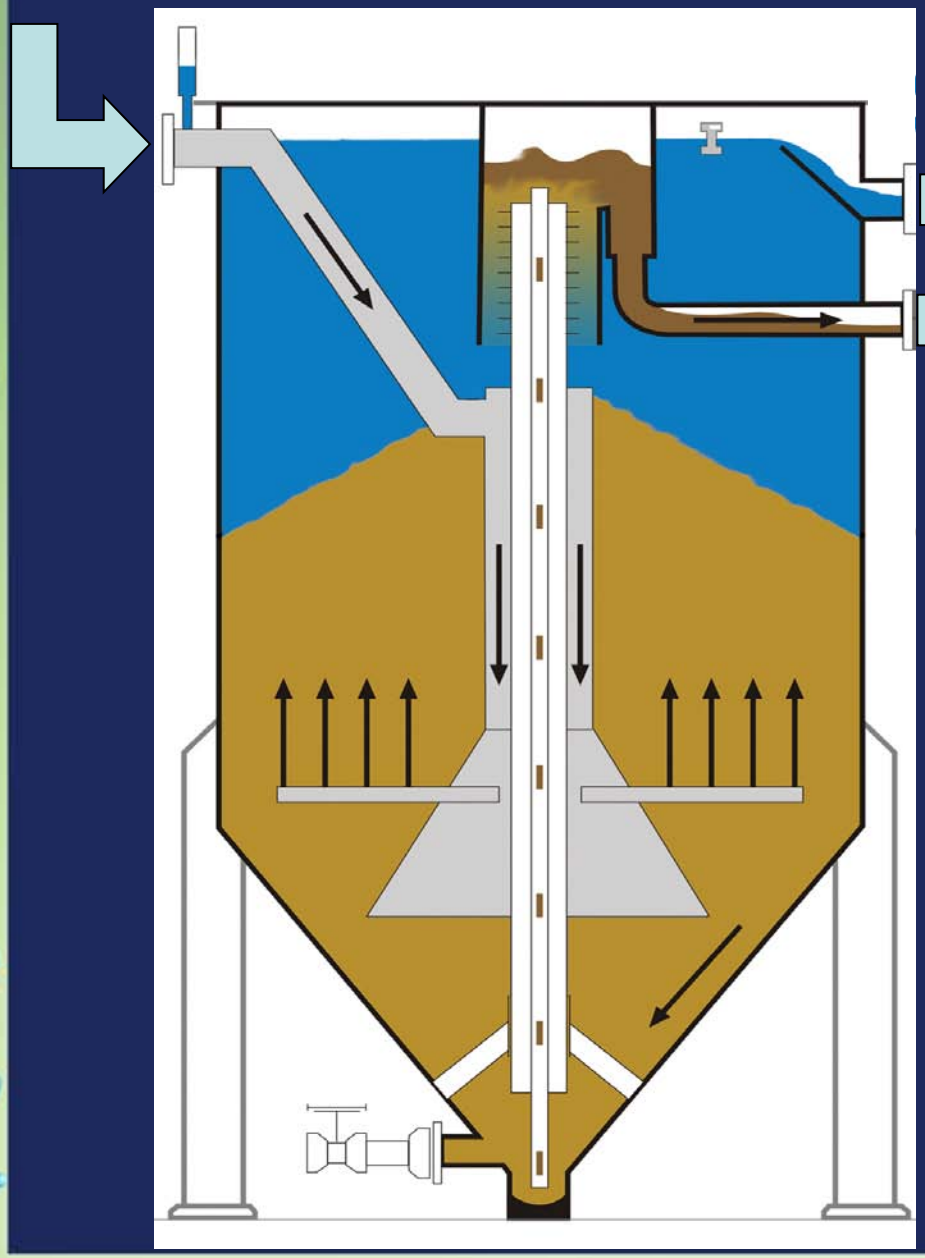
BLUE WATER TECHNOLOGIES

Applications

- Centra-flo™ provides water reuse-quality filtration
- Blue PRO® lowers phosphorus to <0.010 mg/L
- Blue NITE™ produces <3 mg/L nitrogen

BLUE WATER TECHNOLOGIES

Centra-flo™ Filters



- Gravity sand filters
- Continuous backwash
- No moving parts
- Water reuse-quality filtration
- CA Title 22 accepted

BLUE WATER TECHNOLOGIES

Centra-flo™ Filters

- Fiberglass or concrete
- 5 gpm to multi-MGD projects

BLUE WATER TECHNOLOGIES

The Blue PRO® Process

- Blue PRO® removes 90% phosphorus from water
- Higher levels of treatment are readily achieved with:
  - series system
  - reject recycle

Blue PRO®

BLUE WATER TECHNOLOGIES

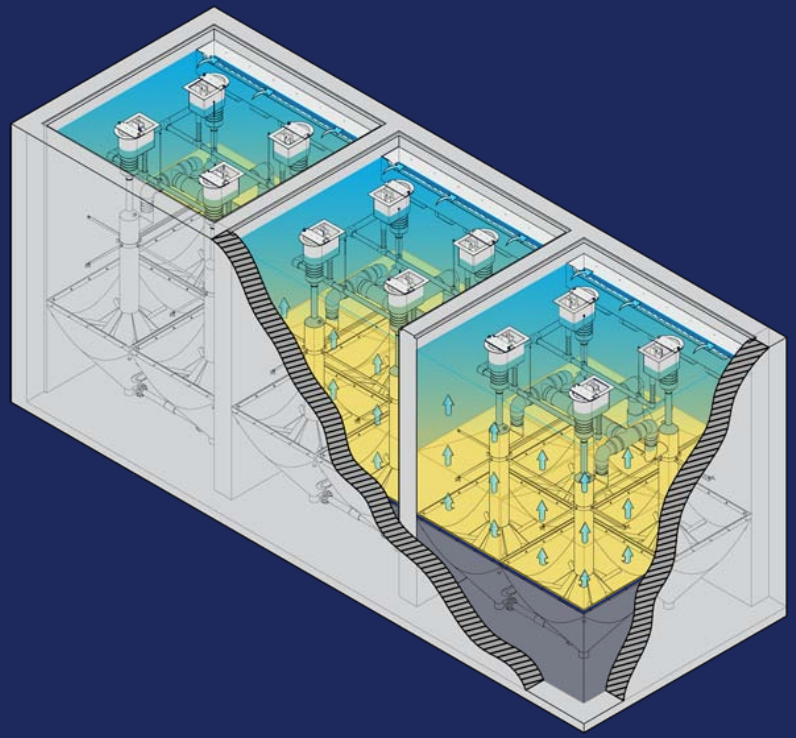
The Blue PRO® Case Study – NOSOCA Pines

- INLET CONDITIONS
- Flow < 25,000 gallons per day.
- TSS Peak 30 ppm, Monthly Average less than 10 ppm
- Total Phosphorus Peak 8 ppm, Monthly average less than 5 ppm
- Total non-Reactive Soluble Phosphorus < 10 ppb

- OUTLET CONDITIONS
- Total Monthly Average Phosphorus Outlet <0.06 ppm

BLUE WATER TECHNOLOGIES

The Blue PRO® Case Study – Westerly

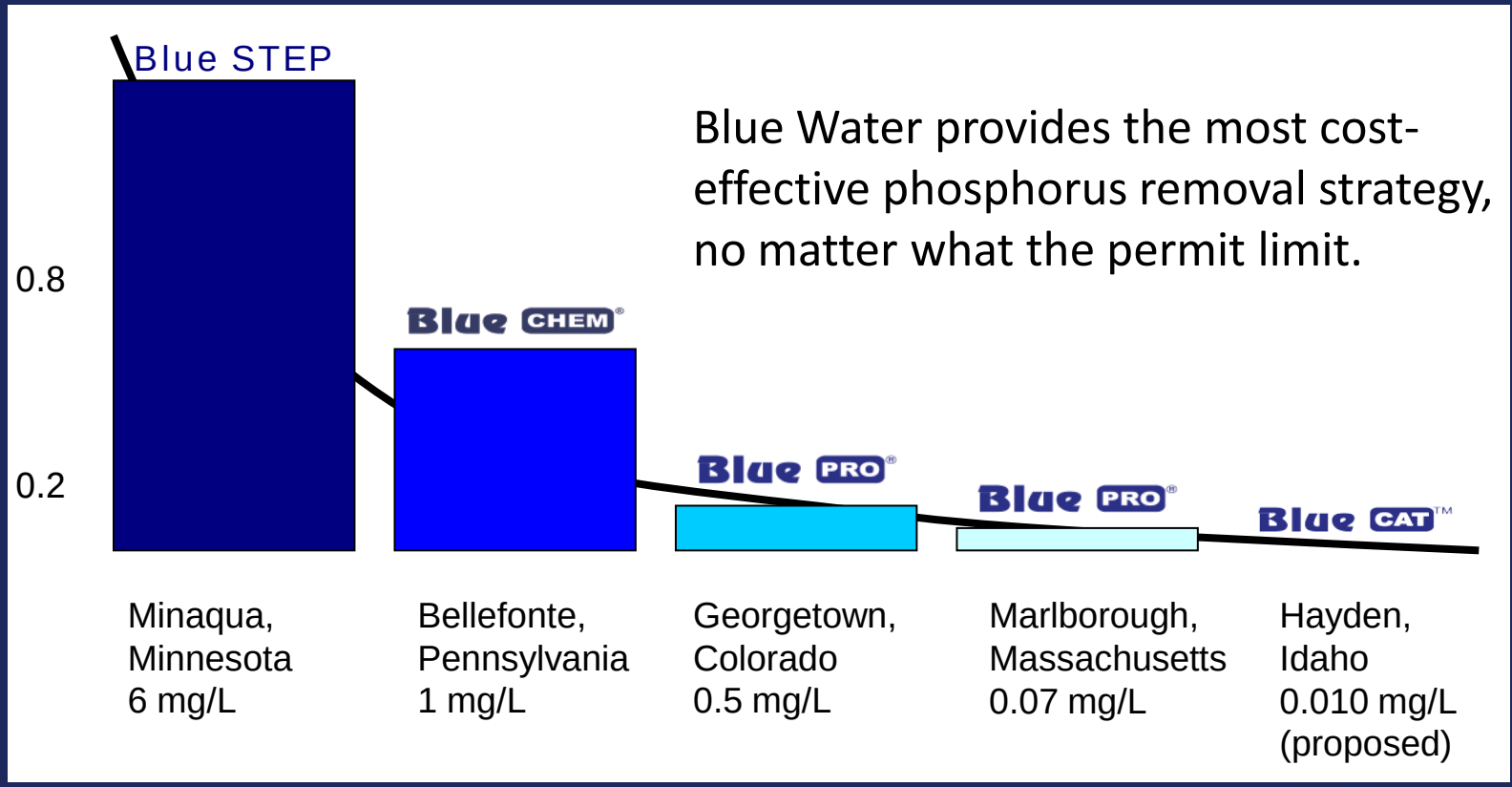


- **Equipment:** Six (6) Model CF-200
- **System Size:** 4.15 MGD average flow, 11.62 MGD peak hr flow
- **Deliverable:** 70 ppb TP
- **Installation Date:** Construction in progress, start-up in June 2012
- **Location:** Westerly WWTP, Marlborough, MA

BLUE WATER TECHNOLOGIES

Discharge Requirements

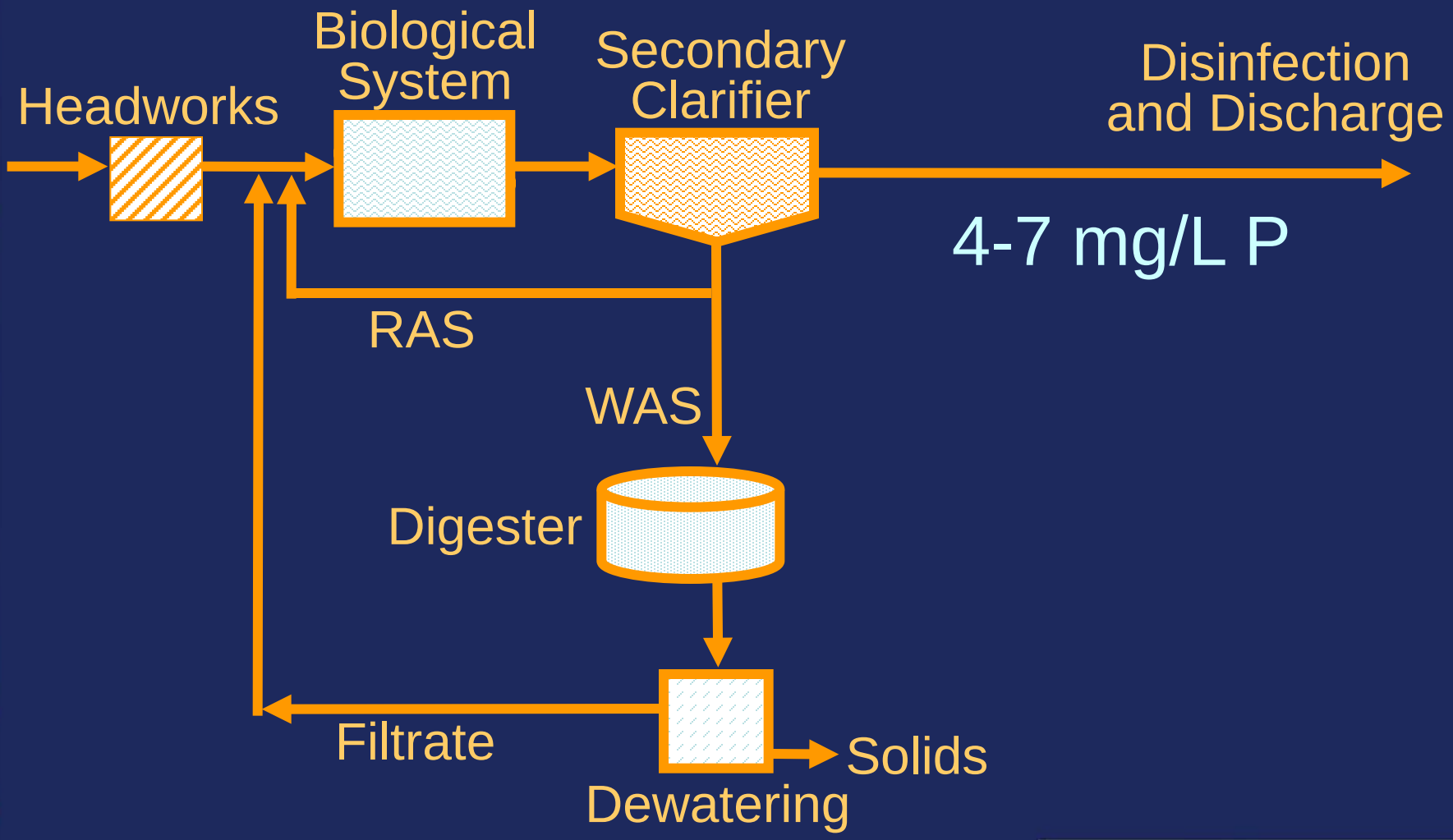
Blue Water is the leader in achieving dramatically lower limits.



Blue Water provides the most cost-effective phosphorus removal strategy, no matter what the permit limit.

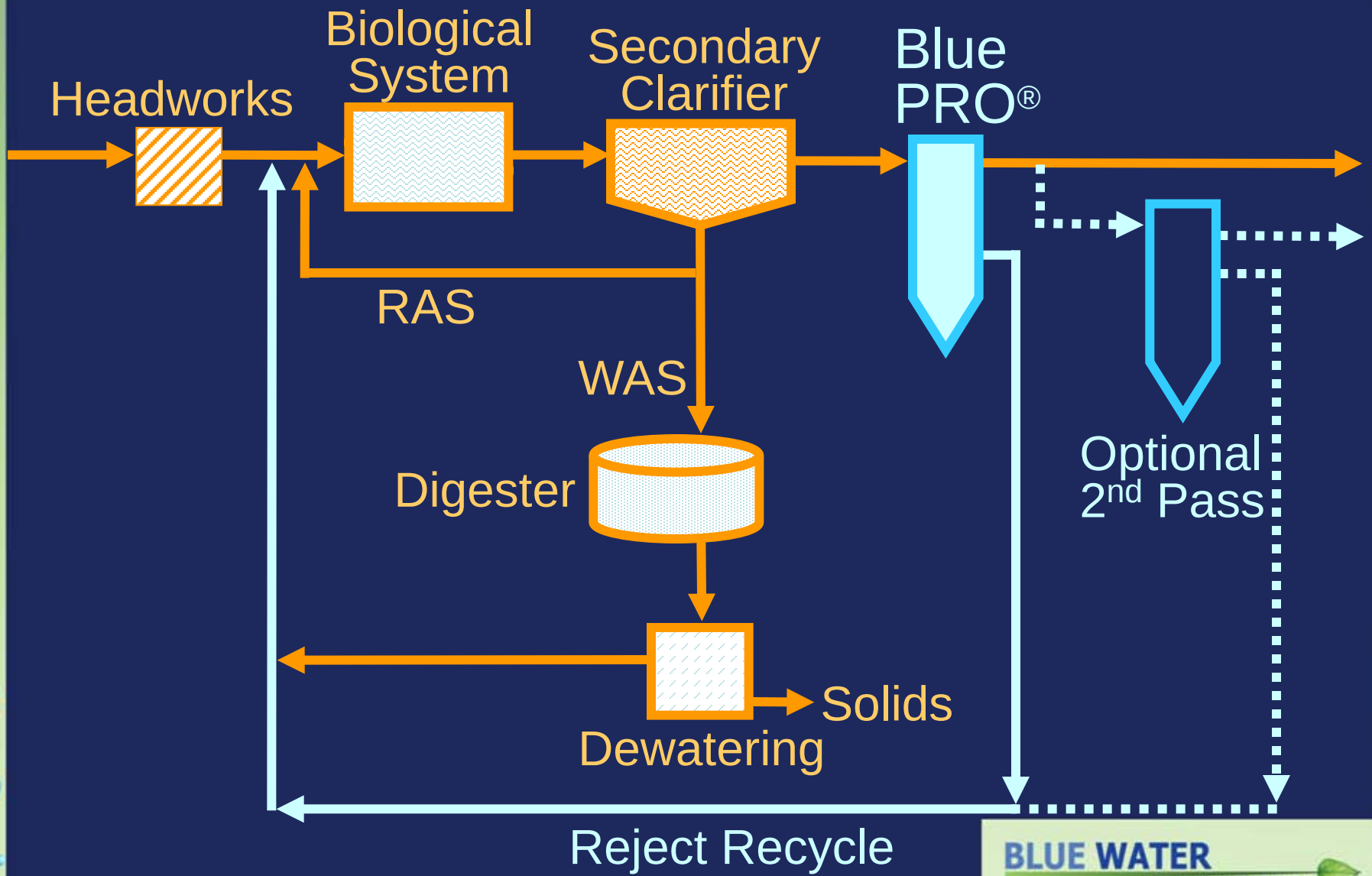
BLUE WATER TECHNOLOGIES

Wastewater Plant



BLUE WATER TECHNOLOGIES

Blue PRO® Retrofit

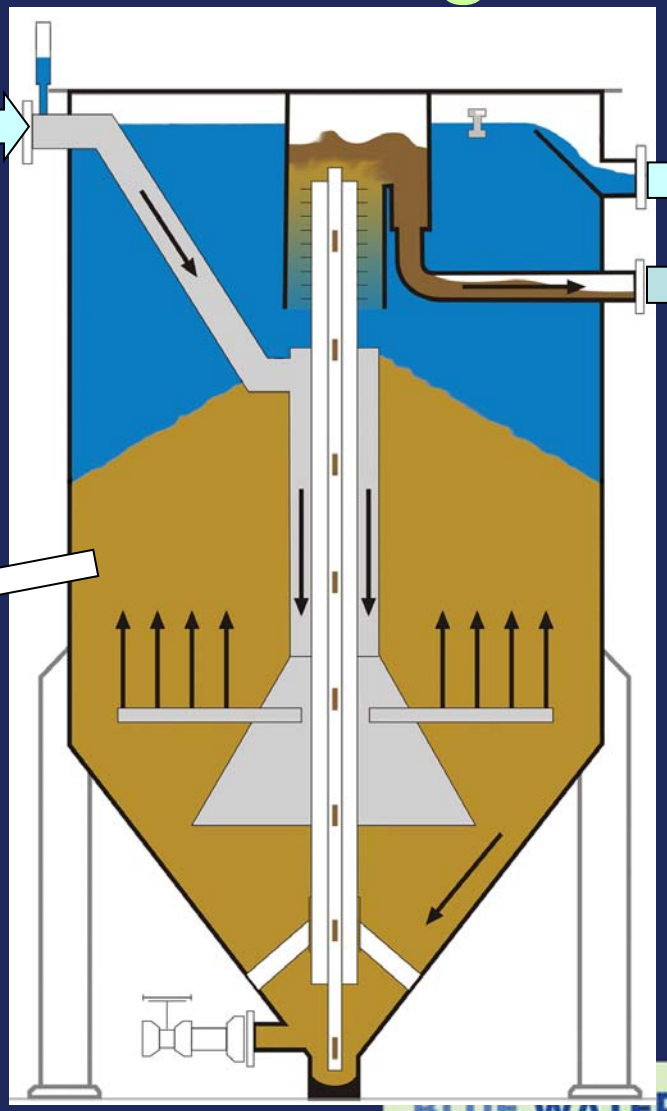


BLUE WATER TECHNOLOGIES

Blue PRO® Process Diagram

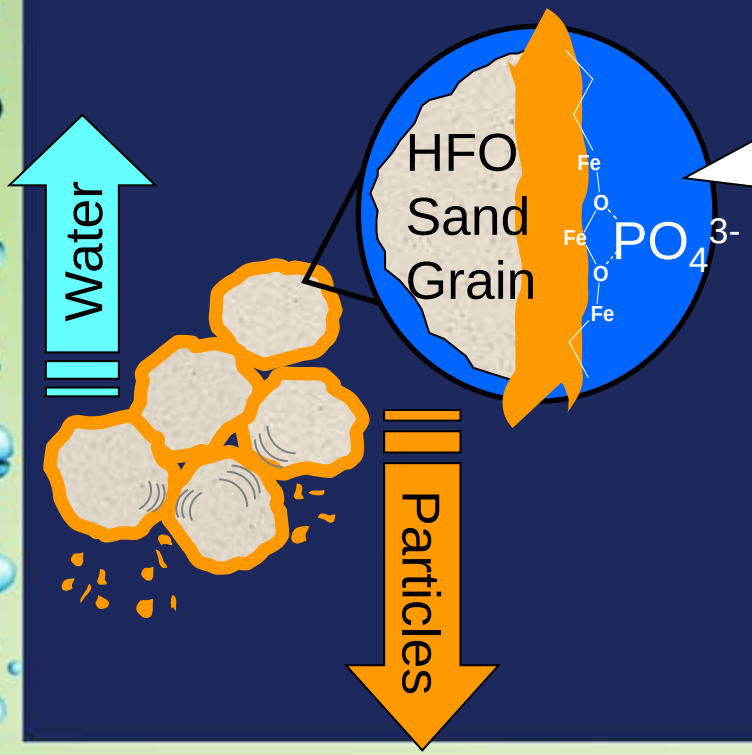
Secondary Effluent

Rapid Conditioning Zone



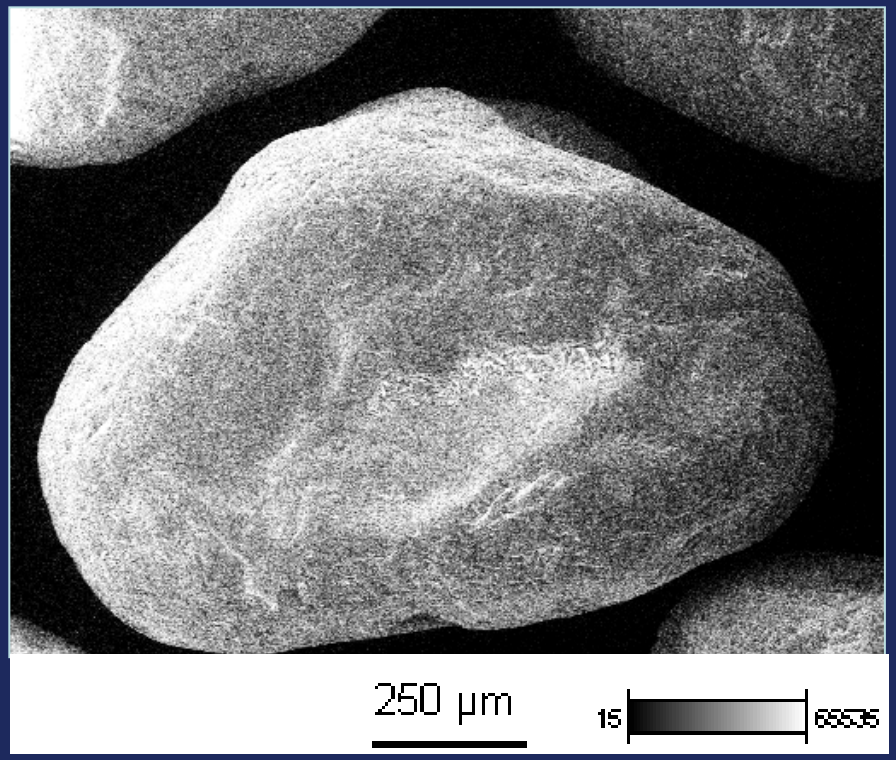
Clean Water

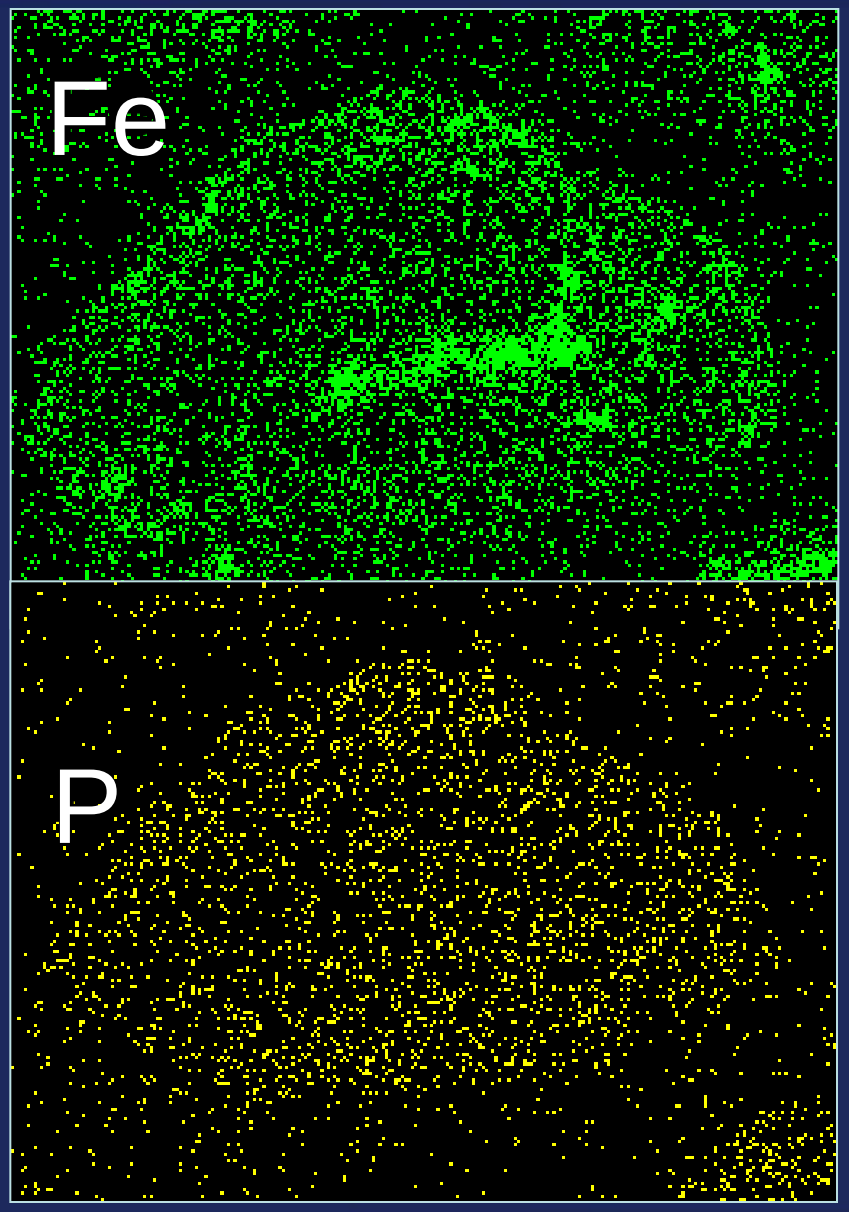
Reject Stream



BLUE WATER TECHNOLOGIES

Blue PRO®



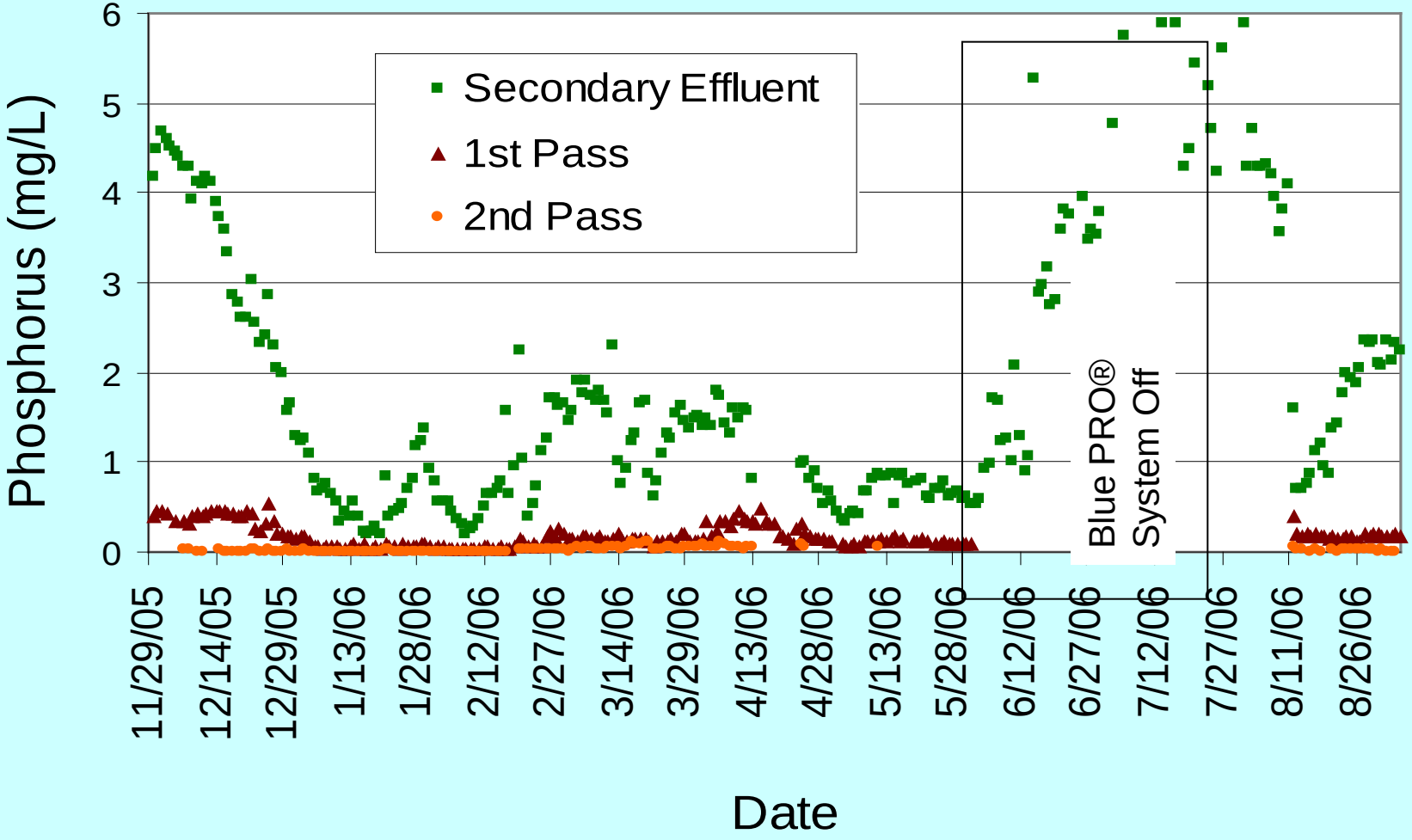


Hydrous ferric oxide-coated sand

-Images from scanning electron microscopy
X-ray fluorescence

BLUE WATER TECHNOLOGIES

Blue PRO® Reject Recycle



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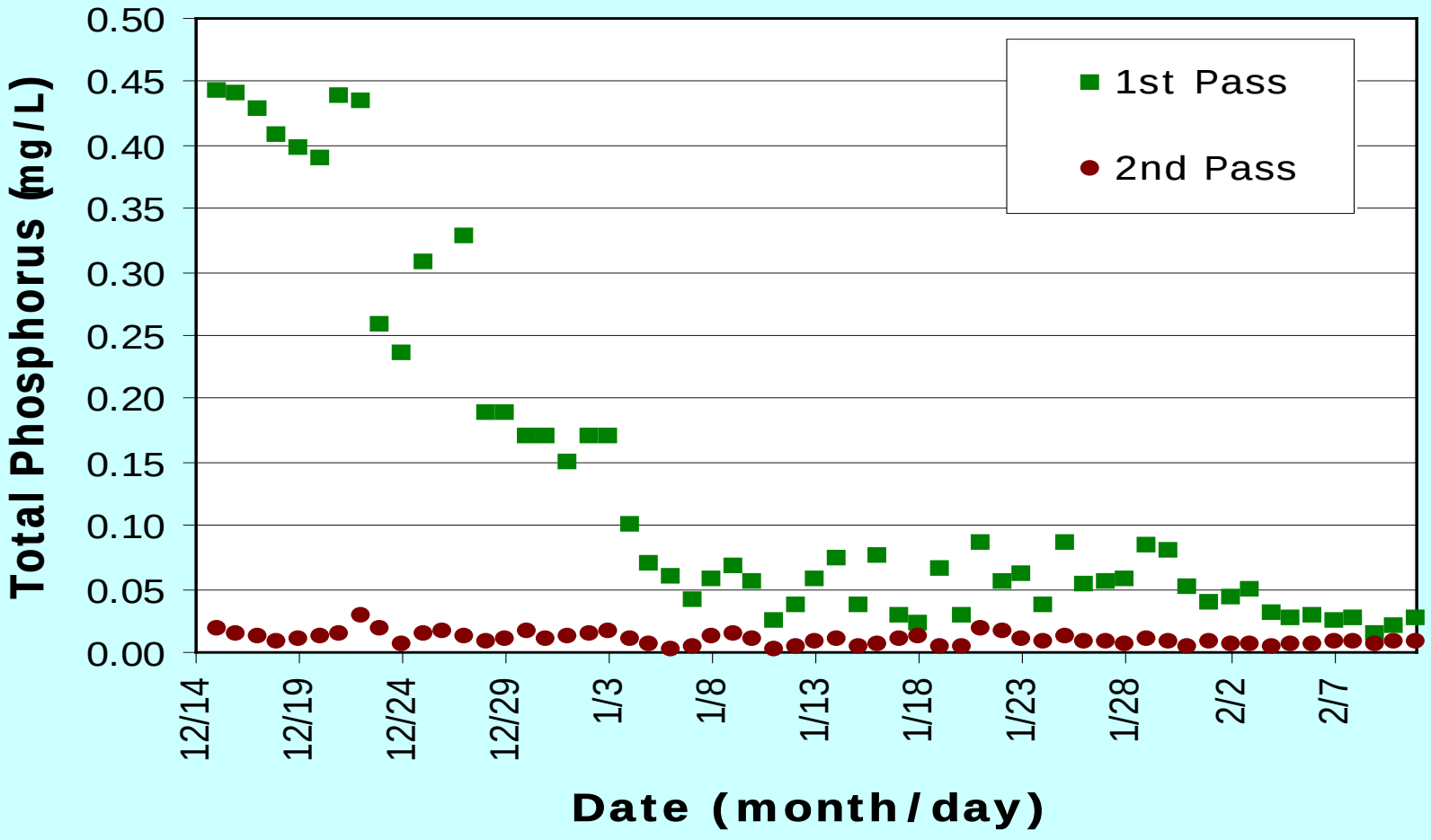
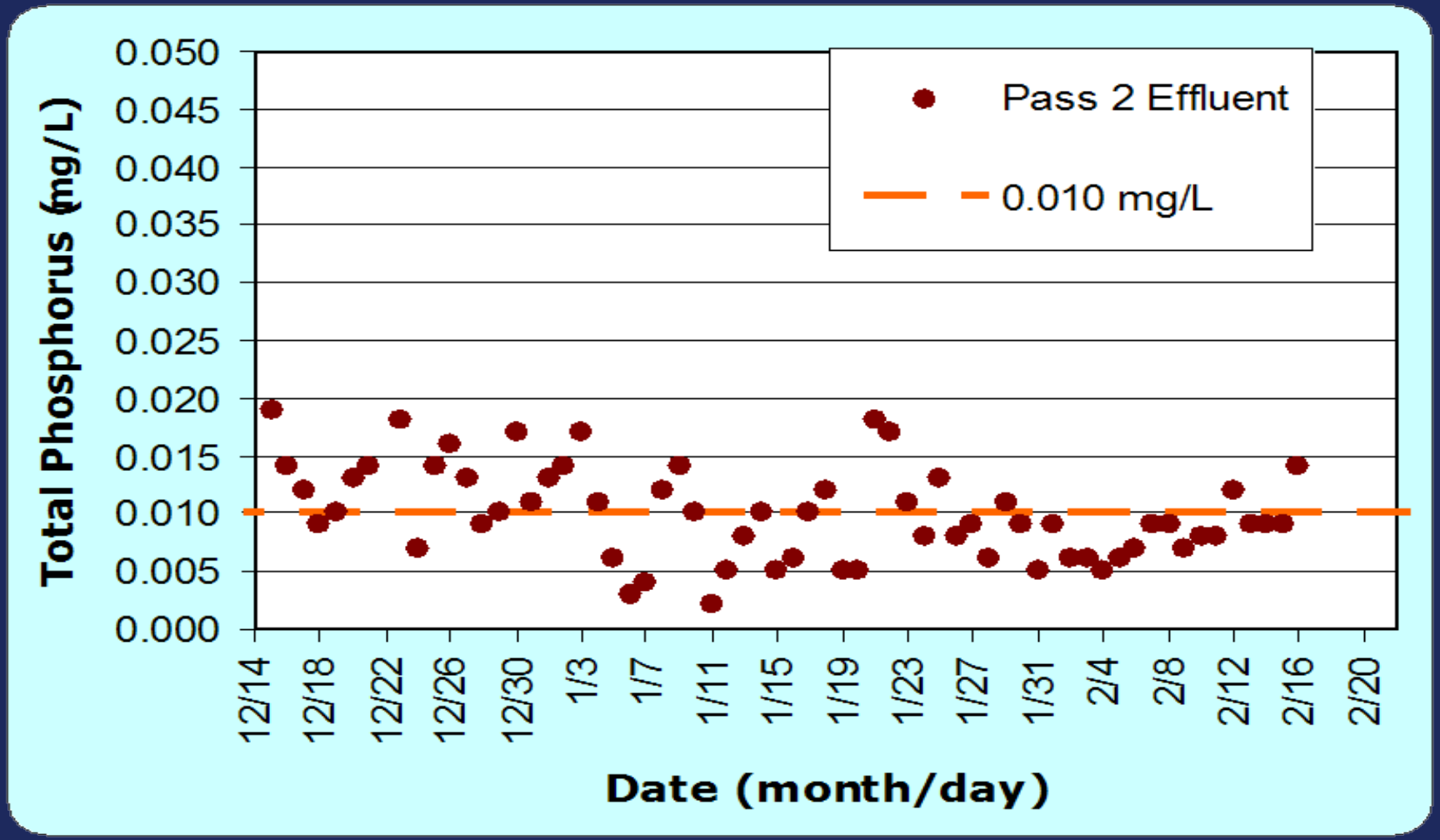
Blue PRO® One or Two Pass



BLUE WATER TECHNOLOGIES

Low-Level Phosphorus Results



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Additional Results

Results from Blue PRO® installations:

- One-month average = 0.009 mg/L TP
- Turbidity <1 ntu
- TSS <1 mg/L
- BOD <2 mg/L
- Reagent dose is low, 6-15 mg/L Fe
- Drier biosolid, increased odor control

BLUE WATER TECHNOLOGIES

Waste Handling

- Phosphorus final fate is in waste solids
- No changes are required in the waste handling system
- No significant increase in amount of waste produced or waste disposal costs
- Recycling rejects may reduce other chemical use at some plants
- Reject characteristics:
  - 1st Pass (mg/L): 6.4 TP, 164 Fe, 366 TSS
  - 2nd Pass (mg/L): 0.64 TP, 118 Fe, 213 TSS
  - Flow = 7.5% per pass, or ~15% for 2-pass

BLUE WATER TECHNOLOGIES

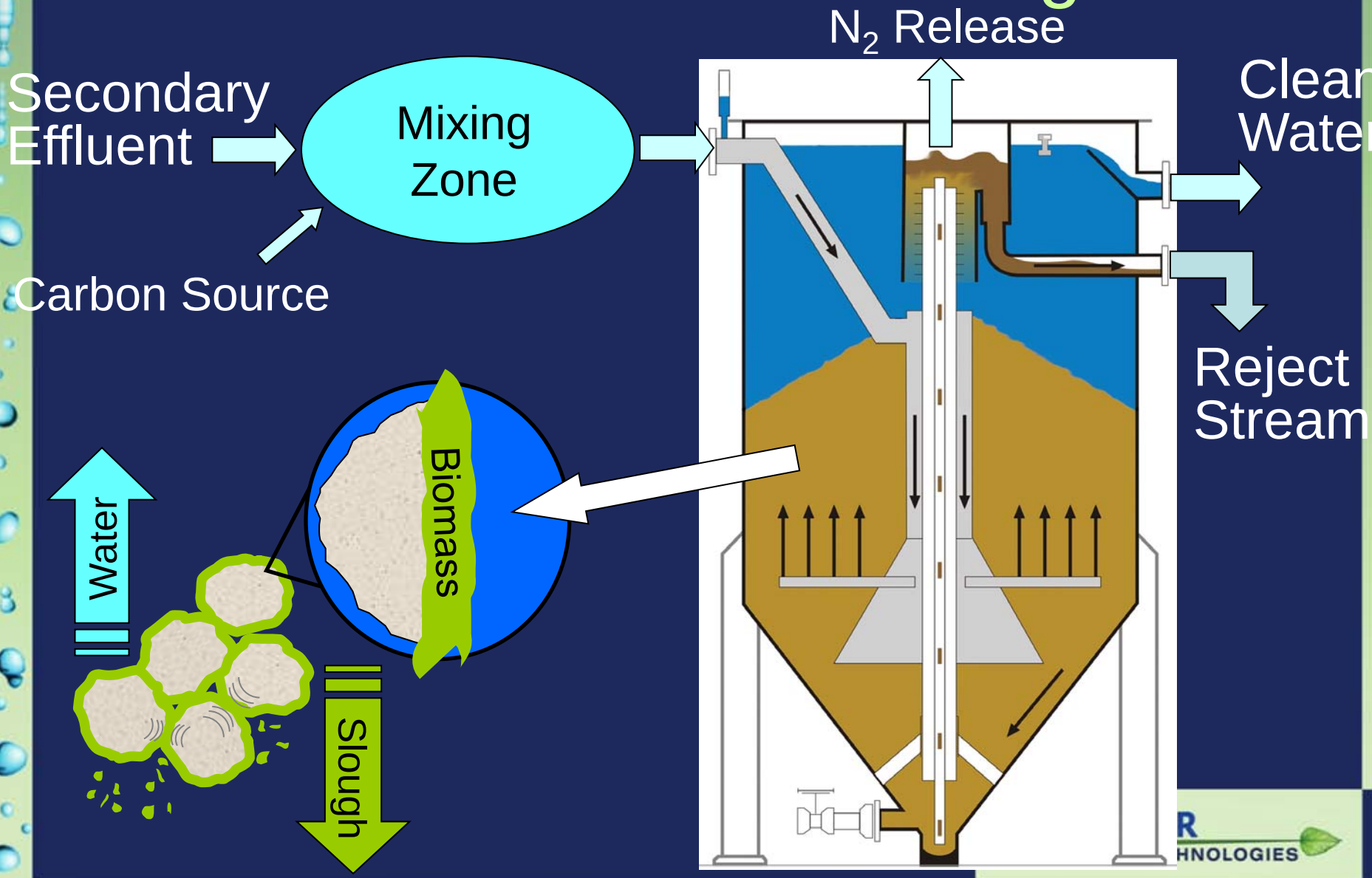

Efficient Nitrate Removal
DENITRIFYING BACTERIA
Centra-flo™
Reject
Wastewater Treatment
Filter Burping Virtually Eliminated
Tertiary Polishing
Reduces Equipment Footprint
Nitrogen
Atmospheric Nitrogen
Modular
Nitrogen Mitigation
Denitrification
Total Nutrient Reduction
California Title 22 Accepted
Water Reuse Applications
Alternative Carbon Sources
Continuous Backwash Gravity Sand Filters
Sand
For a Green World
Blue NITE™
No Plant Redesign
Less than 1 mg/L NO_x-N
Cost Effective
Filtration
Water
BLUE WATER TECHNOLOGIES
Removes Phosphorus Simultaneously

Denitrification by Blue NITE™

- Nitrogen removal is achieved by Blue NITE™ at multiple locations nationwide
- Nitrate may be lowered to <0.3 mg/L N
- Adding filters for denitrification is more cost-effective than reconfiguring the secondary system

BLUE WATER TECHNOLOGIES

Blue NITE™ Process Diagram



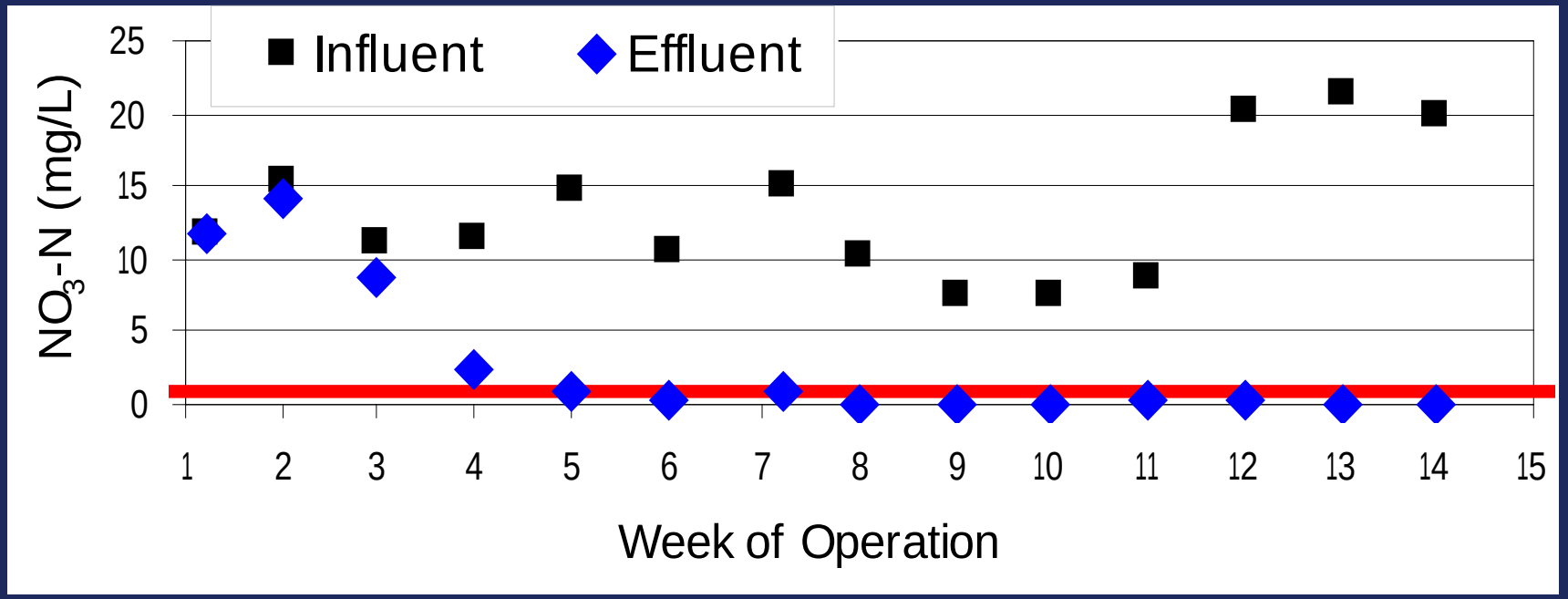
Blue NITE™ Design Parameters

- A carbon source is required: methanol or alternatives (i.e., MicroC, Unicarb)
- Loading (1-4 gpm/ft^2) is dependent on nitrate level, variability, performance required, DO, temperature, C-source, process control, etc.
- Patent-pending process control system
- Phosphorus removal can be simultaneous
- Demonstration units available

BLUE WATER TECHNOLOGIES

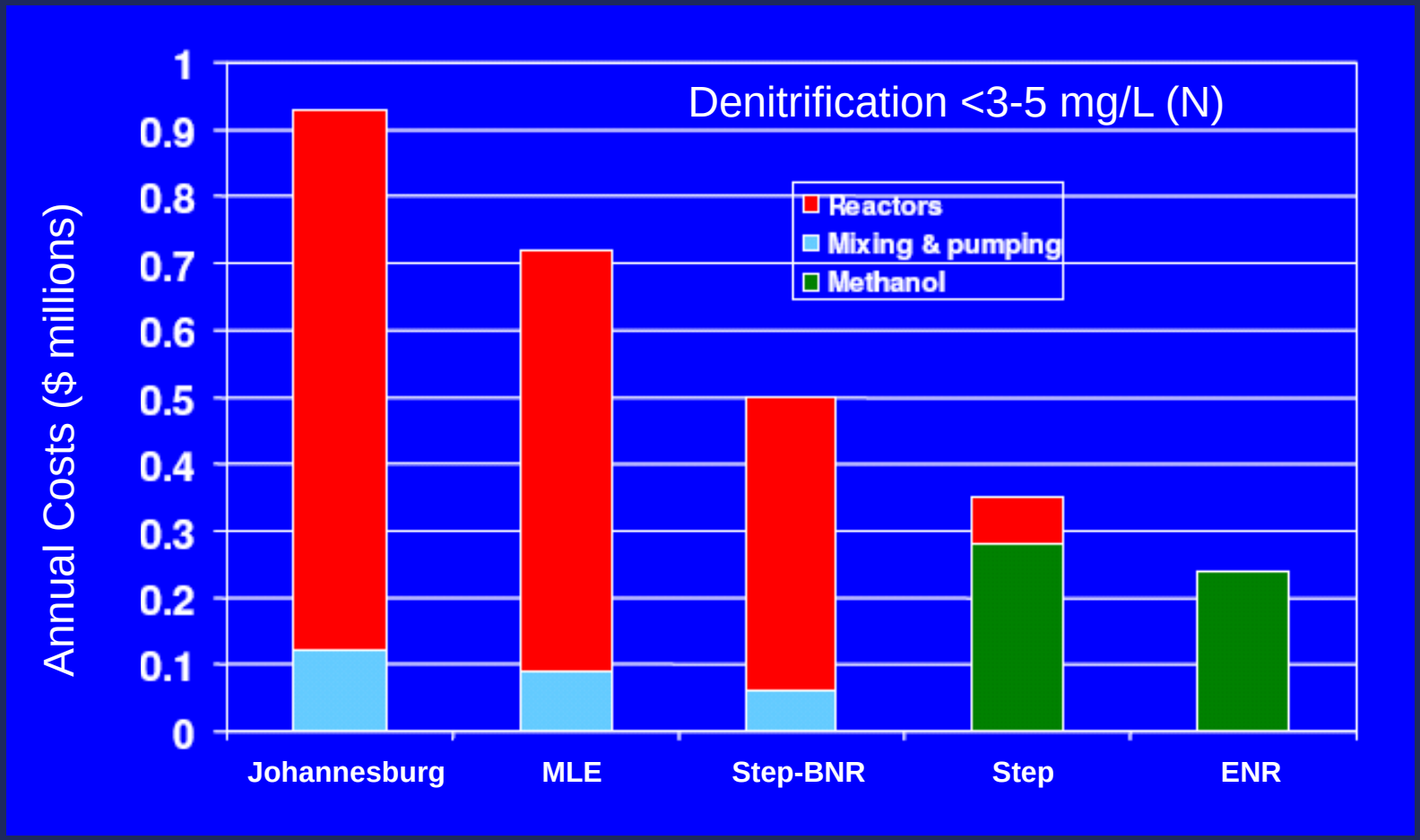
Blue NITE™ Results

After Biological System Startup



BLUE WATER TECHNOLOGIES

Technology Cost Comparison



NYWEA 78th Annual Meeting – Tom Wilson, Earth Tech

"Upgrades to BNR: Optional Approaches" IWA BNR 2005 conference in Krakow

BLUE WATER TECHNOLOGIES

Simultaneous P and N Removal

Results from one filter pass:

- TP : 3.4 to 0.14 mg/L (< 0.02 mg/L with second pass Blue PRO®)
- Nitrate-N: 10.6 to 2.2 mg/L
- Nitrite-N: 0.55 to <0.015 mg/L

- Ammonia-N: 0.82 to 0.11 mg/L
- Ferric sulfate and MeOH added

BLUE WATER TECHNOLOGIES

Questions?

www.blueh2o.net

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