FREESE AND NICHOLS

Emerging Technologies

BINATIONAL BORDER SANITATION AND WATER QUALITY SUMMIT

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Presented by: Gary Smith, P.E.

Freese and Nichols, Inc.

What is driving innovation?

- Water scarcity
- Regulations
- Energy
- Emerging contaminants

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Nutrient Removal

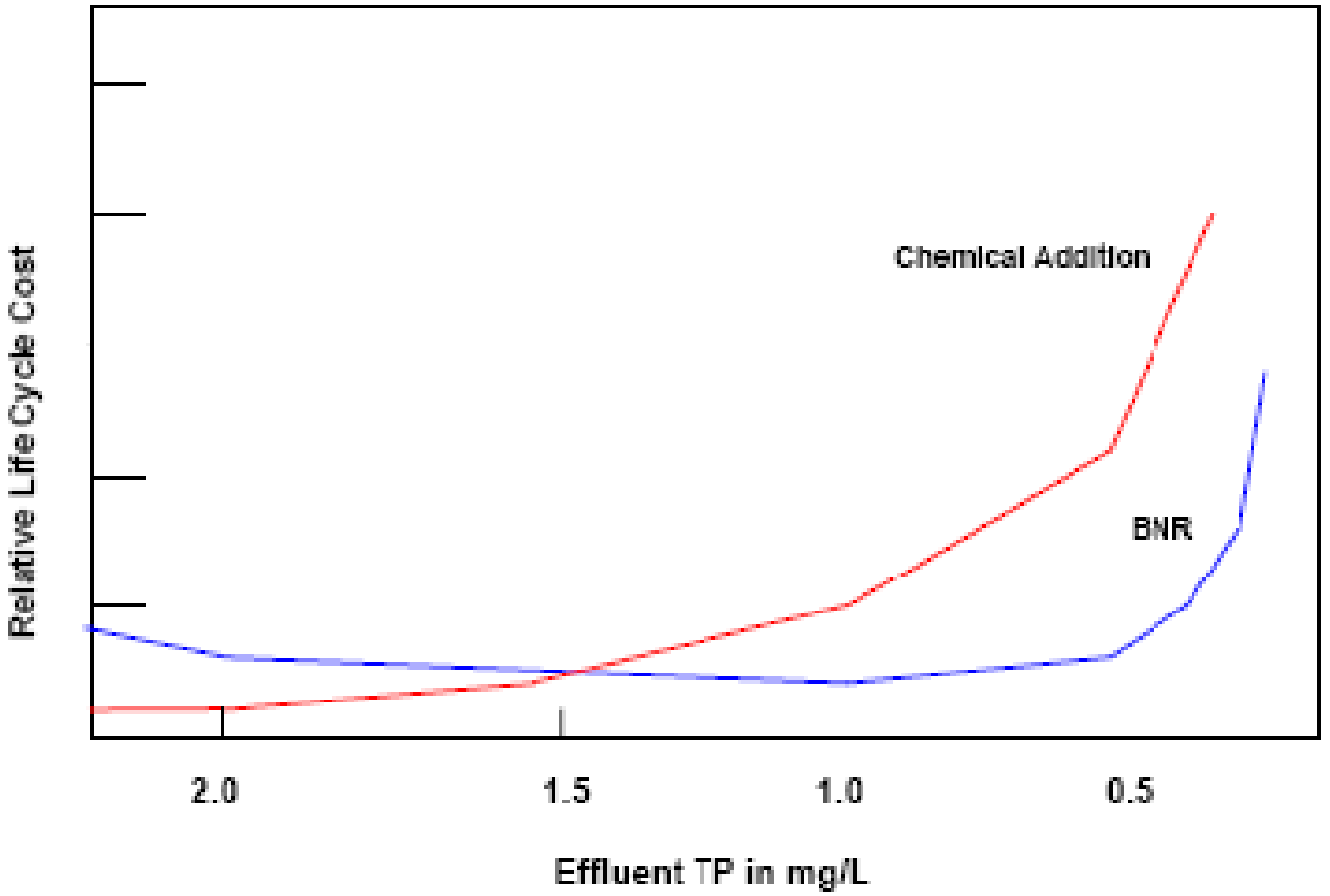
Nutrients: Potential Impacts

- Algae
- Rooted vegetation
- Aesthetic effects
- Taste and Odor
- DO depletion

Chemical Phosphorus Removal

- Precipitation of phosphorus
  - Ferric chloride
  - Aluminum sulfate
- Application points
  - Primary clarifiers
  - Aeration basins
  - Secondary clarifiers
  - Tertiary filters

Probable Costs for Lower Effluent P Concentrations



Biological Nutrient Removal (BNR)

Aerobic Conditions:

- BOD removal
- Nitrification

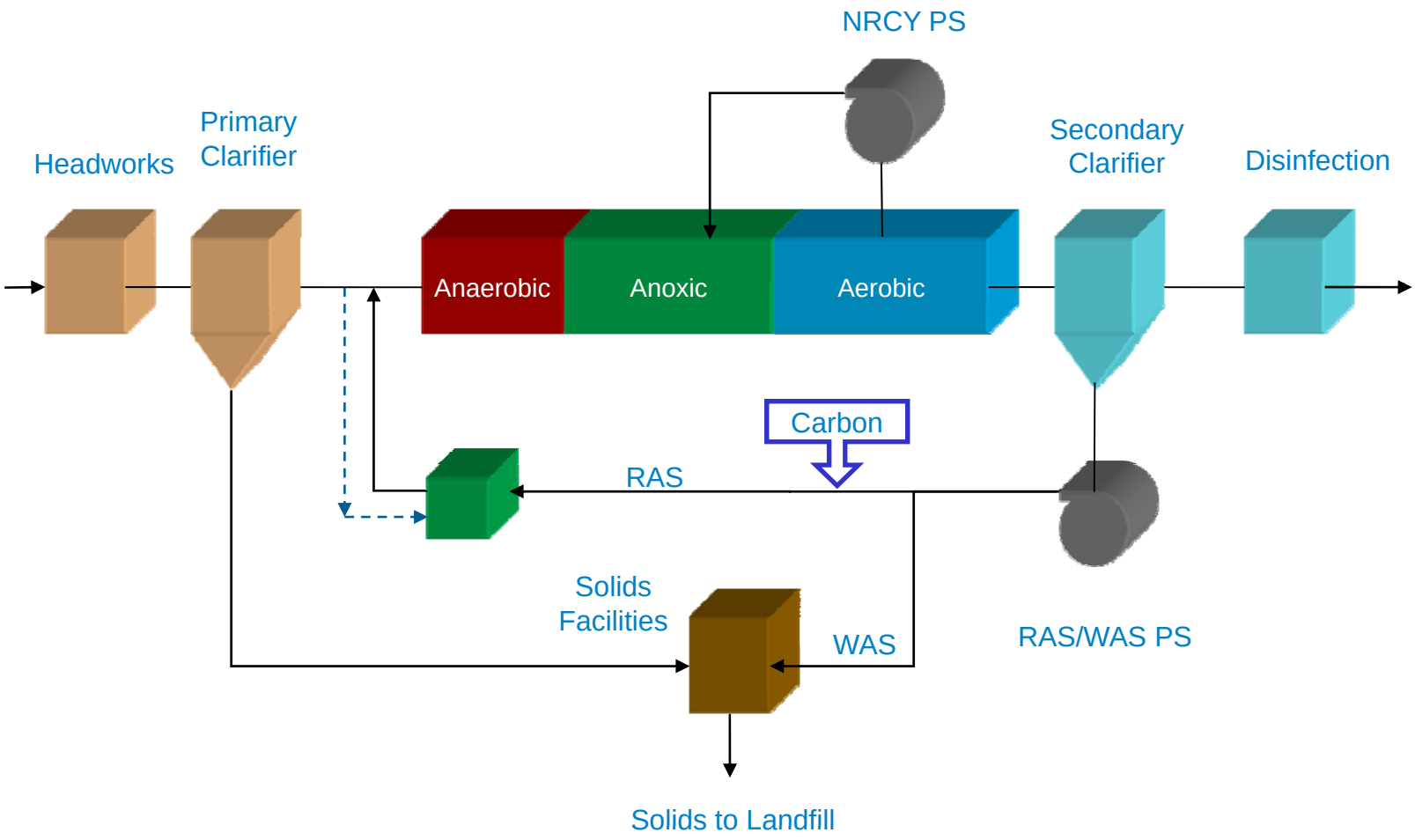
Anoxic Conditions:

- Denitrification

Alternating Anaerobic Aerobic Conditions:

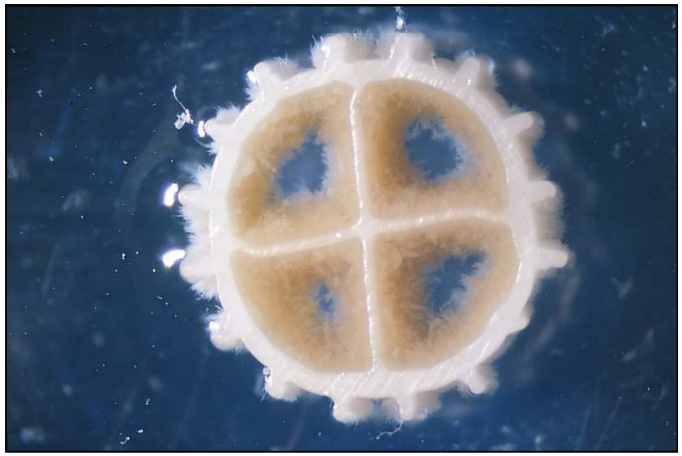
- Phosphorus removal

BNR


NRCY PS
Primary Clarifier
Headworks
Secondary Clarifier
Disinfection
Anaerobic
Anoxic
Aerobic
Carbon
RAS
Solids Facilities
WAS
RAS/WAS PS
Solids to Landfill

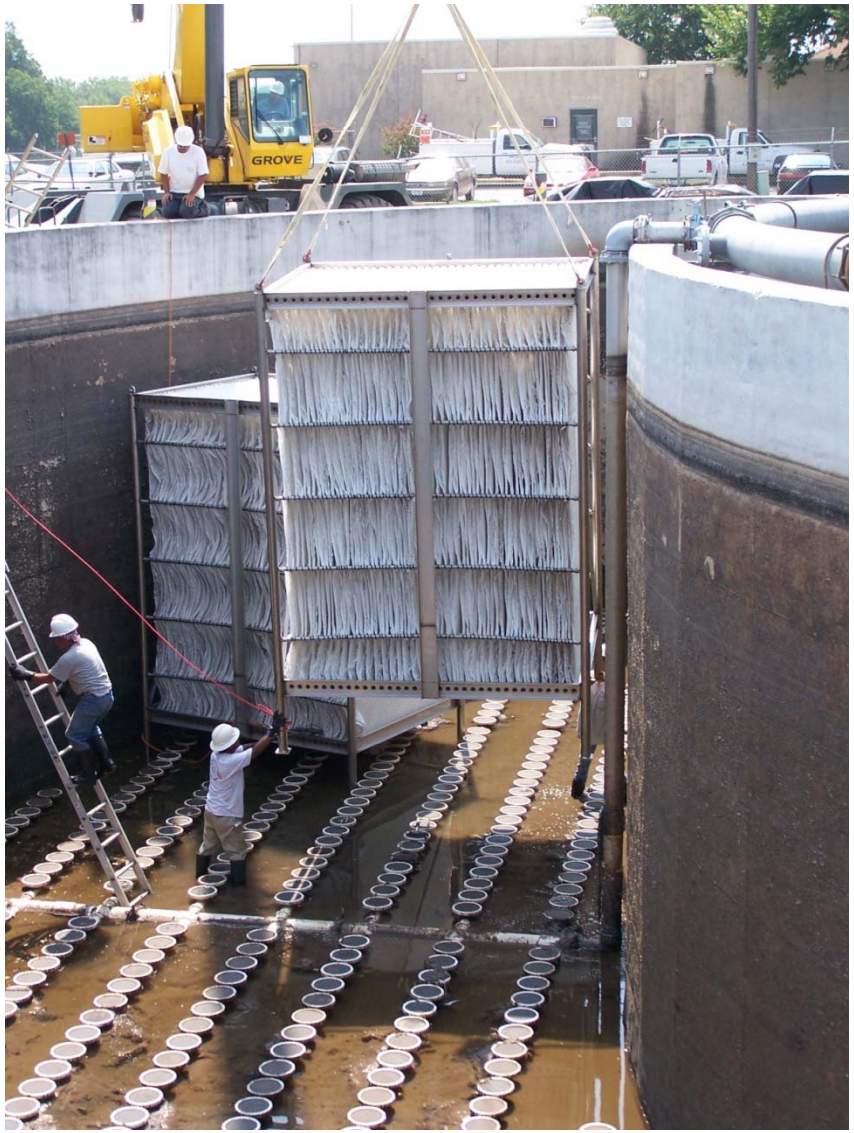
Integrated Fixed Film Activated Sludge (IFAS)

- Hybrid treatment system
- Combines fixed film with activated sludge
- Types of IFAS systems
  - Floating support media
  - Solid support media
- Media provides surface area for biological growth to attach



IFAS - Floating Media Systems

IFAS - The Colony, TX



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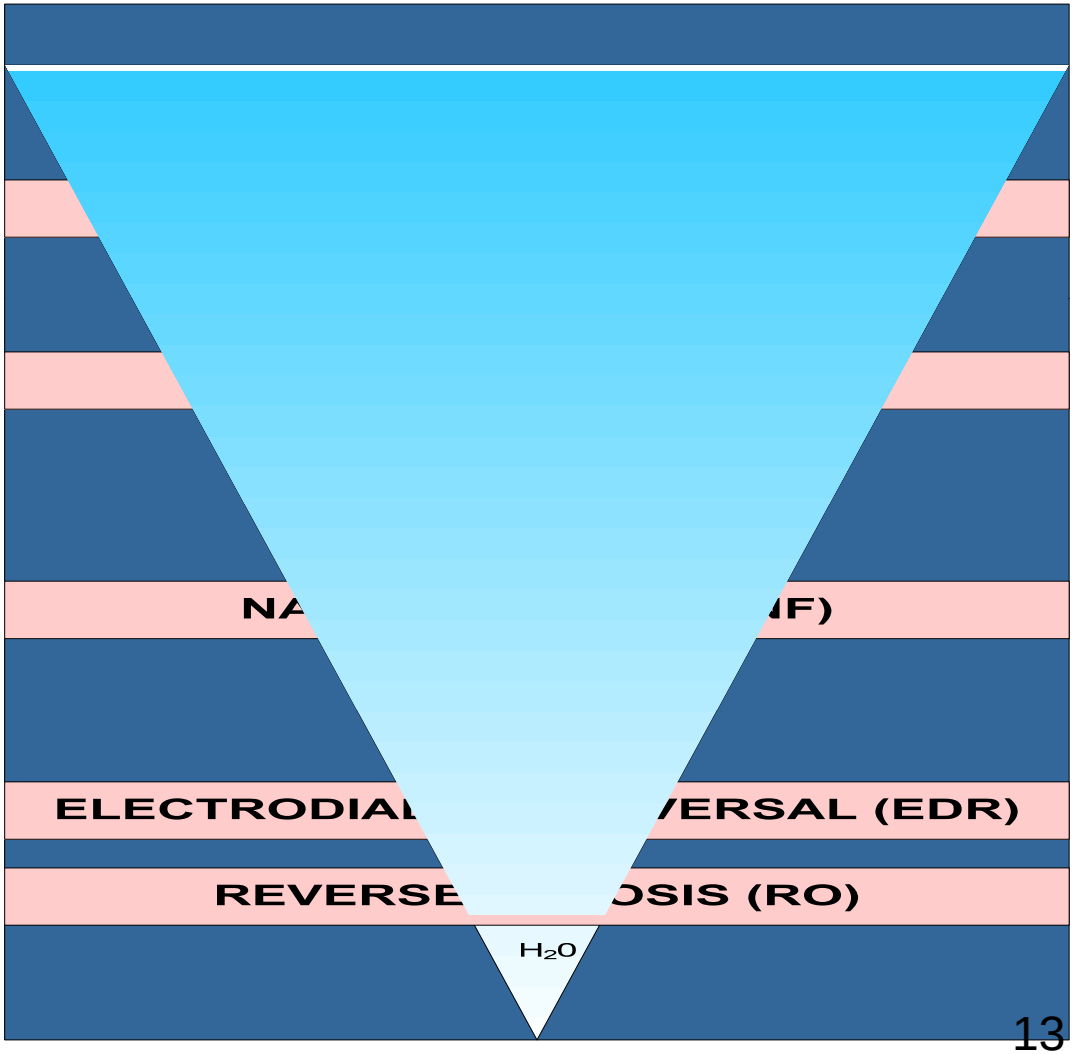
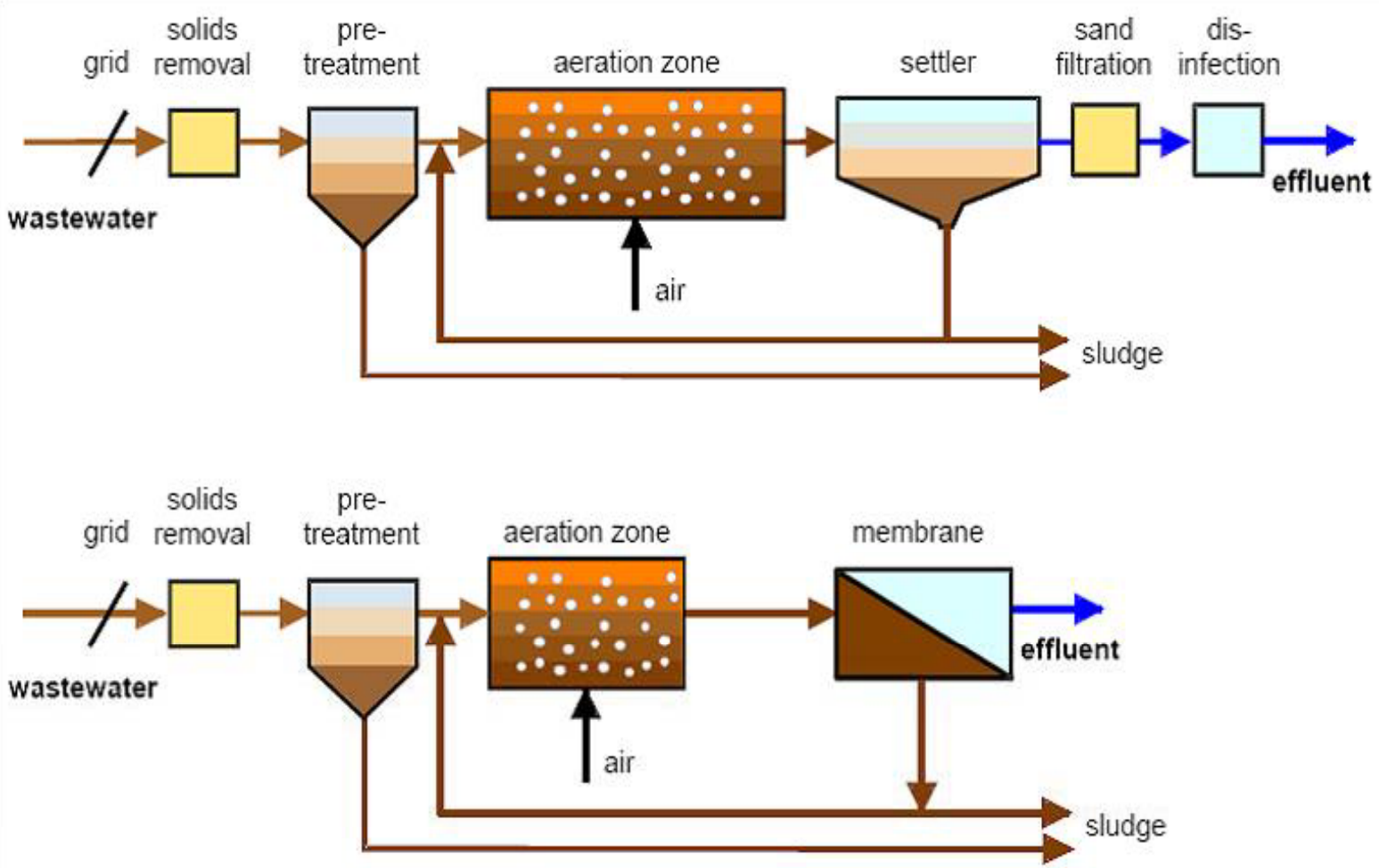
Membranes

Membrane Separation Processes



Membrane Bioreactor

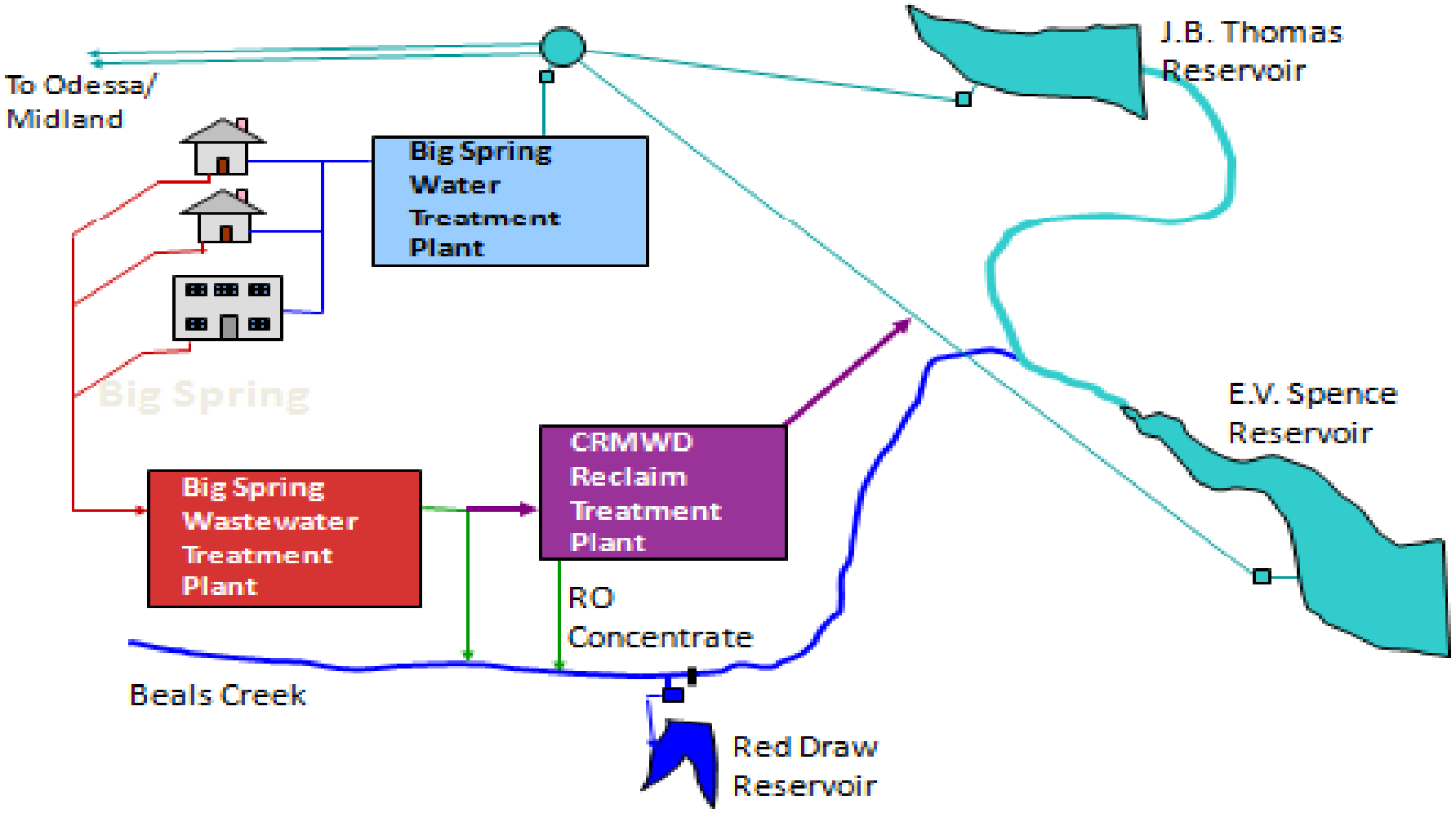


Desalination

- Brackish water
- Seawater
- Water reclamation

Water Supply Augmentation

Proposed Big Spring Reclamation Project



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Biologically Active Filters

Biologically Active Filters

- Granular Activated Carbon (GAC) media
- Growth of microorganisms on media
- Removal of organics

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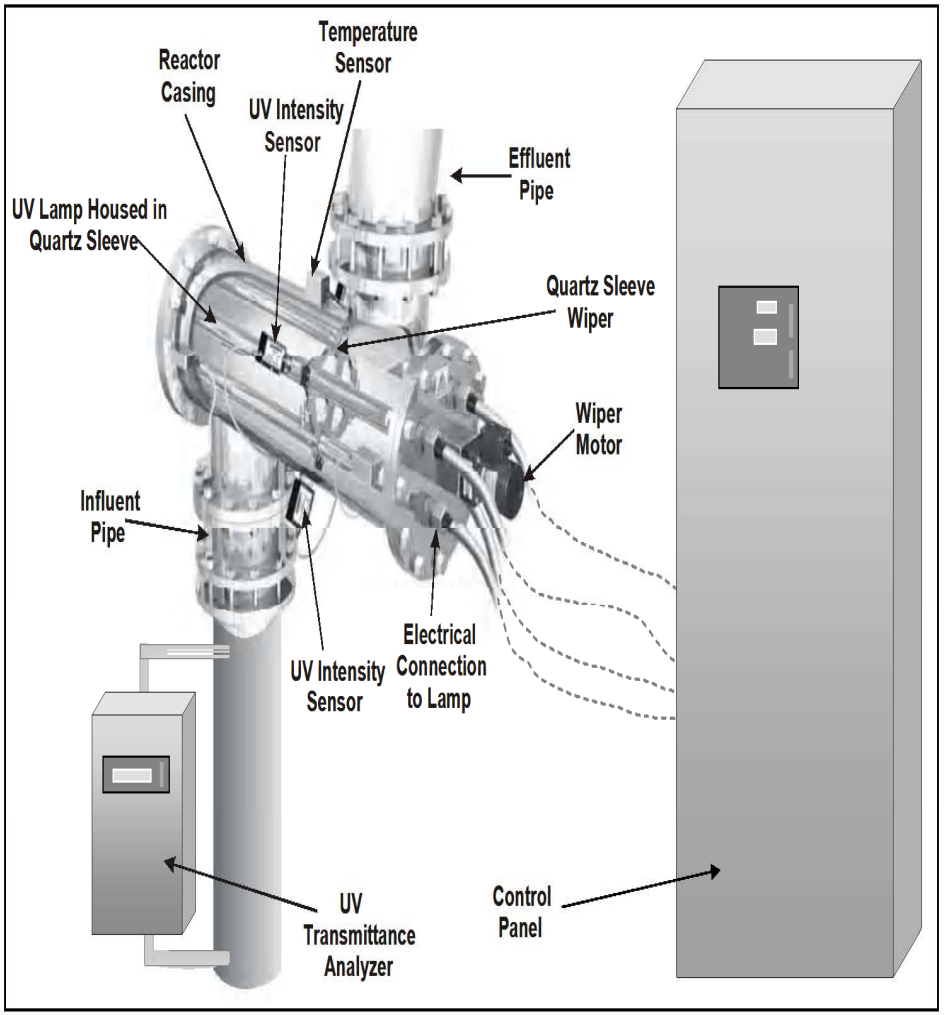
Ultraviolet Disinfection

Ultraviolet (UV) Disinfection

- Physical process
- Germicidal mechanism
- Transmittance and intensity

UV Disinfection



Source: Courtesy of and adapted from Severn Trent Services
Note: Not to scale

Evaluating Technologies

- Establish treatment objectives
- Identify appropriate technologies
- Screen technologies
  - Cost
  - Layout
  - Operator training