SBR System Basics

Paul Schuette
Territory Manager
Objective

• Introduction
• SBR Process Basics
• SBR Equipment
  • Aeration
  • Decanters
  • Mixers
  • Controls
SANITAIRE  Product History

a Xylem brand

• 1960’s Robust Packaged and Field Erected Package Plants.

• 1970’s Invented low-maintenance stainless steel coarse bubble aeration.

• 1980’s Developed ceramic and membrane disc aeration systems.

• 1990’s Entered SBR market with purchase of ICEAS technology.
  (first ICEAS install in U.S 1985)
What’s an SBR?
Typical Activated Sludge Process

- Influent
- Primary Clarifier
- Primary Effluent
- Aeration
- Mixed Liquor
- Secondary Clarifier
- Effluent
- Return Activated Sludge
- Waste Sludge
Sequencing Batch Reactor - Fill and Draw Theory

1. Fill (Aerated or Unaerated)

2. React

3. Settle

4. Draw

5. Idle

Screened and Degritted Influent

TWL

Effluent

Waste Sludge
Conventional SBR Batch Mode

Influent → Screening → Closed

Grit Removal → Open

SBR #1

SBR #2

Effluent
ICEAS Operating Cycle (Pemberville)

1. React
Continuous Flow of Screened and Degritted Influent

2. Settle

3. Decant
Waste Sludge

Treated Effluent
SBR Process

Start of REACT Phase
SBR Process

End of REACT Phase
SBR Process

Start of SETTLE Phase
SBR Process

End of SETTLE Phase
SBR Process

Start of DECANT Phase
SBR Process

End of DECANT Phase
SBR Process

Start of REACT Phase
Why SBR?

No Clarifiers (Primary or Secondary)

No Return Sludge Pumping or Piping

Flexibility to accommodate varying loads/flows

Single digit effluent

BNR (upgrades to existing)

System Supply/Guarantee
Why SBR?

- Can be applied to a wide range of plant flows…
- 10,000 gpd to 80 MGD
- Of the more than 16,000 POTW in US… guess 900+ are SBR

Cardiff, UK – 80 MGD
SBR Process Basics

Typical Design Parameters

Nominal Loading Rates: 15-20 lb/1000 ft³
F:M Ratio: 0.05-0.125
Sludge Age: 10 - 25 Days
HRT: 12 - 24 Hours
Typical Municipal WW Treatment Cycle
Example 1

HOURS

SETTLE  DECANT  AIR

BASIN 1

BASIN 2

0  2  4

HOURS
Typical Municipal WW Treatment Cycle
Example 2
SBR Manufacturer Scope of Supply

Decant Mechanism
Aeration System
Blowers & Air Control Valves
Waste Sludge Pumps
Mixers
Control System
SBR Equipment

- Screened Influent
- Baffle
- Mixers
- WAS Pump
- Decanter
- Diffusers
- Effluent Discharge
AERATION EQUIPMENT
COMMON SBR AERATION SYSTEM TYPES

Fine Bubble
Coarse Bubble
Jets
Mechanical
FINE BUBBLE

- Highest oxygen transfer efficiency
FINE BUBBLE MAINTENANCE

- Minimal, includes hosing off diffusers
- Every 2-3 years
- Membrane life is 7-10+ years
COARSE BUBBLE

- Lower Maintenance but….
- Typically requires 50 - 60% more power than fine bubble fixed floor
JET AERATION

- SOTE similar to fine bubble aeration
- Requires blowers, motive pumps, & valve gallery
MECHANICAL AERATION
DECANTER
Decanter Function and Key Features

Withdraw treated water
Exclude floatables
Maintenance
How is it controlled?
Decanter Types

Fixed Decanter
Pumps
Floating Decanter
Pivoting Trough (Sanitaire)
Pivoting Trough

Lowers into the liquid

Electromechanical Actuator

Gravity
Floating Decanter

- Mechanical or Air Actuation
- Some have check valves
- Decant Control Valve
- Fiberglass Construction
- Gravity Operation
Fixed Decanter

- Mixed Liquor Settles below Weir
- Automated Valve
Mixers
Controls
Questions?