

SEQUOX® Biological Nutrient Removal

Activated Sludge Process Provides Nutrient Removal with High Quality Treatment and Energy Savings



The rectangular layout of the SEQUOX Process results in a smaller footprint and easy expansion.

The SEQUOX Biological Nutrient Removal Process is a patented process and the latest innovation for biological nutrient removal from Aero-Mod. SEQUOX (*SEQUential OXidation*) offers the benefits of sequencing aeration with the reliability of continuous clarification, resulting in consistently superior effluent quality with total nitrogen levels as low as 3-5 mg/L. Phosphorus removal can be achieved by incorporating an anaerobic

selector and/or chemical addition. The process is energy efficient and has a small footprint, lowering capital costs.

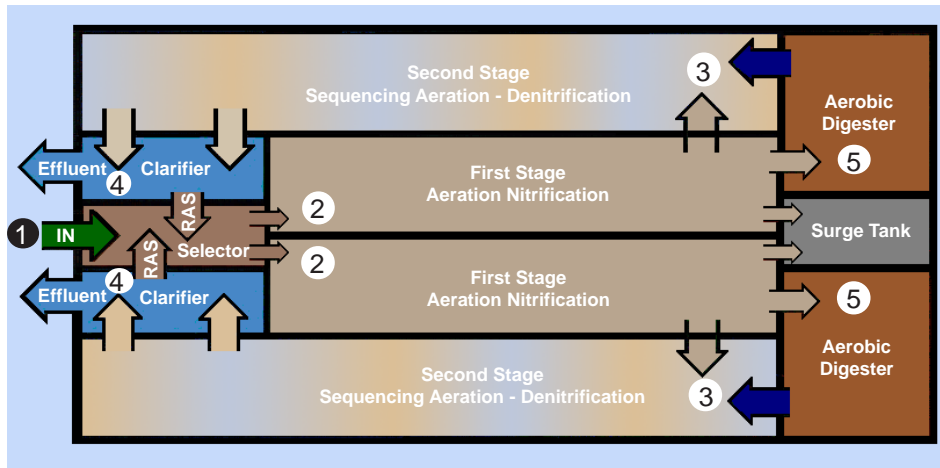
The SEQUOX process incorporates the patented ClarAtor® clarifier technology, another low-maintenance, operator friendly solution featuring stainless steel and fiberglass components with no moving parts below the water. Its unique flow regulation system provides in-basin surge storage. In fact, the SEQUOX

SEQUOX Process

- Biological nutrient removal
- Ability to handle up to 4:1 sustained peak flows with ClarAtor clarifier technology
- Continuous clarification with sequencing aeration
- Operator friendly, low maintenance
- Selector tank promotes better settling characteristics
- Dedicated nitrification tank
- Sequencing without stopping blowers
- No moving parts below the water surface
- Superior effluent quality

process offers the ability to handle up to 4:1 sustained peak flows with no bypassing of untreated wastewater. Many collection systems encounter sustained peak flows during wet weather conditions. When infiltration and inflow is a problem, the SEQUOX-HF system offers high flow treatment capabilities.

Process Bulletin



SEQUOX Biological Nutrient Removal

1 – Flow enters into a **Selector Tank** where the raw sewage is combined with returned activated sludge (RAS) from the clarifiers.

2 – This mixture then flows into continuously aerated **First Stage Aeration Basins**, where adequate retention time is provided to achieve excellent BOD and ammonia removal (nitrification).

3 – Flow continues into the **Second Stage Aeration Tanks**, which operate in parallel. The aeration is sequenced on and off from one tank to the other. The process alternates which basin is aerated, typically sequencing the on/off cycle on a two hour basis. The end result is excellent denitrification without having to turn the blowers on and off, but by controlling which tank is receiving air.

The nitrate laden MLSS from the first stage is incorporated into oxygen depleted Biomass in the second stage.

This settled biomass becomes oxygen deprived, thus using nitrates for their oxygen source (denitrification). During re-aeration, additional BOD removal and nitrification continues. The cycle is repeated several times as the liquid mass progresses through the tank to the clarifier.

4 – The mixture then enters the **ClarAtor clarifier** where the biomass is settled and hydraulically returned to the selector tank. The clarified effluent is withdrawn and discharged.

5 – At regular intervals, solids are automatically or manually wasted to the **Aerobic Digester**. Supernatant is automatically decanted back to the aeration process via a fixed overflow weir.

During denitrification, a portion of the oxygen required to oxidize the ammonia nitrogen into nitrate nitrogen is reclaimed. When the bacteria use the chemical oxygen from the nitrates, this reduces

overall oxygen requirements, thus reducing total energy costs. The denitrification process also reclaims alkalinity. If alkalinity levels are low, the Sequox process can reduce or eliminate chemical costs associated with pH control.

The process is controlled within the tanks by sequencing the air with simple timer logic.

Even if nutrient removal is not the primary objective, the SEQUOX process is a cost effective solution that insures future nitrogen limits can be met with no biological process upgrades required.

ClarAtor Clarifier

Combining the SEQUOX Process with the patented ClarAtor clarifier technology offers the ability to handle up to 4:1 sustained peak flows with no loss of solids. Other ClarAtor advantages include:

- No moving parts below the water
- Unique ability to regulate effluent flow rate for in-basin surge storage
- Uniform influent distribution and collection
- Stainless steel and fiber-glass fabrication
- Rapid and positive sludge withdrawal
- Minimal maintenance