

# SEQUOX<sup>®</sup> Biological Nutrient Removal

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



*Holton, KS 0.528 MGD*

Aero-Mod believes nutrient removal requires energy efficiencies. The SEQUOX<sup>®</sup> Biological Nutrient Removal Process along with the **DO**optimizer<sup>®</sup> control meets this requirement. It is the latest innovation for biological nutrient removal from Aero-Mod. SEQUOX (SEQUential OXidation) offers the benefits of sequencing aeration with plug flow kinetics and the reliability of continuous clarification. Consistent superior

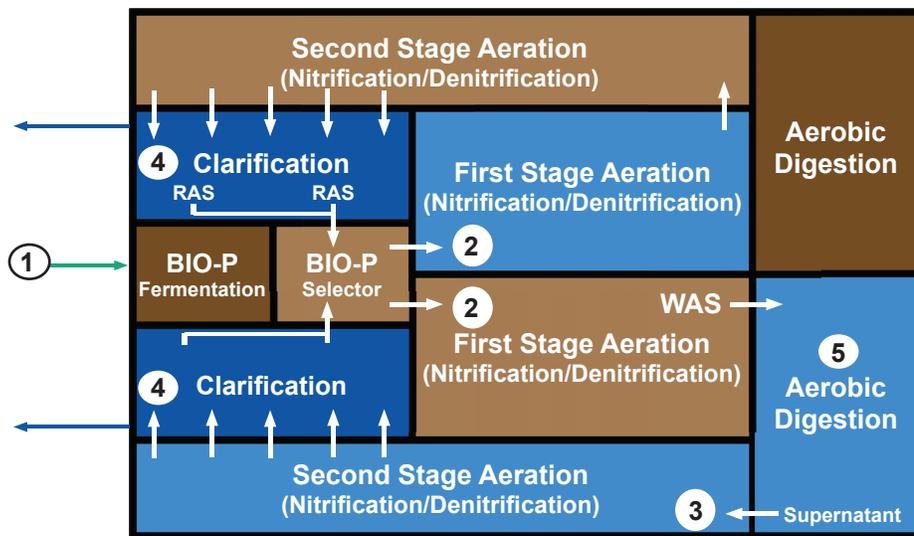
effluent quality is achieved with total nitrogen levels as low as 3 mg/L. Phosphorus removal can be achieved by incorporating a fermentor/anaerobic selector and/or chemical addition. The process is energy efficient and has a small footprint. Furthermore, it requires no recycle pumps or mixers.

The SEQUOX<sup>®</sup> process often incorporates the ClarAstor<sup>®</sup> clarifier technology which is

**FEATURES**

- Biological Nutrient Removal
- Plug flow kinetics
- Continuous clarification with sequencing aeration
- Sequential reactions without turning blowers on/off
- Superior energy control
- Operator friendly and low maintenance
- Automatic back-up controls should PLC fail
- Selector tank promotes better settling characteristics
- No moving parts below the water surface

low-maintenance and operator friendly. Featuring stainless steel and fiberglass components with no moving parts below the water, its unique flow regulation system provides in-basin surge storage. The **DO**optimizer<sup>®</sup> control system maximizes energy efficiency by balancing organic demand with mixing energy requirements.



## SEQUOX® Biological Nutrient Removal

**1** – Flow enters into an **Anoxic-Selector Tank** or **BIO-P Fermentor** then **Anaerobic Selector Tank** where the raw sewage is combined with returned activated sludge (RAS) from the clarifiers.

**2** – This mixture then flows into the **First Stage Aeration Basins** where the air is sequenced on/off on a 2 hour cycle. During peak organic loadings the **DO optimizer** controls the alternation of air and can activate both 1st Stage Aeration Basins.

**3** – Flow continues into the **Second Stage Aeration Tanks**. The aeration is sequenced on/off on a 2 hour cycle between these two basins. The sequencing of this on/off air is opposite to the 1st Stage Aeration Basins. The end result of the plug flow process with sequential reactions is excellent nitrification/denitrification without having blowers turned on and off nor have dedicated internal recycle pumps and associated mixers in separate anoxic tanks.

The combination of cyclical aeration

in the four (4) basins creates excellent aerobic conditions for BOD and ammonia removal when aerating. When the air is off, the nitrate laden MLSS settles and becomes oxygen deprived, creating anoxic conditions for the nitrates to become the oxygen source and allow for denitrification to occur. The plug flow process repeats this cyclical on/off aeration several times as the liquid mass progresses through the SEQUOX® process and on to the clarifier.

**4** – The flow then enters the **ClarAstor Clarifier** where the biomass is settled and returned to the Selector Tank. The clarified effluent is withdrawn and discharged.

**5** – At regular intervals solids are automatically or manually wasted to an **Aerobic Digester/Aerated Sludge Holding Tank**. Supernatant is simultaneously decanted back to the aeration process via a fixed overflow weir.

The SEQUOX® process with our innovative **DO optimizer** control strategy offers optimal energy

efficiencies. It has more turn down for under loaded plants than ever before. The control philosophy allows the plant to mimic the actual organic loading coming to it. A plant is driven either in an organically “ACTIVE” mode; or, it is in a mixing “SEMI-ACTIVE” mode; or, it is virtually under no organic load and can “REST”. Energy savings is the result of operating the minimum required basins and reducing blower usage for minimum mixing energy, or, no energy as the blowers are turned off in the “REST” mode.

## LOAD TUNE YOUR PLANT WITH THE



### CONTROL STRATEGY

#### ClarAstor® Clarifier

Combining the SEQUOX process with the ClarAstor clarifier technology offers cost effective compact solution. Other ClarAstor 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 fiberglass fabrication
- Rapid and positive sludge withdrawal
- Minimal maintenance