



EQUANOX SYSTEMS®

EquaReact®

Equalized Nutrient Removal System

- Provides 24 hour and 7 day equalization
- Provides total TN and P removal
- Reduces capital and operational costs
- Reduces energy consumption
- Improves system performance and treatment efficiency



The EquaReact® system is a unique process that combines hydraulic flow equalization and multi-stage activated sludge treatment (anaerobic, anoxic or aerobic) in a biological, or enhanced biological, nutrient removal system for both municipal and industrial wastewater applications.

EquaReact® reduces land requirements, saves energy and reduces capital costs while improving the overall system performance and treatment efficiency.



Process Applications for EquaReact:

- Activated Sludge
- Two Stage MLE
- 3, 4 and 5 Stage Bardenpho
- MBR (Membrane Bio Reactor)
- SBR (Sequencing Batch Reactor)
- MBBR (Moving Bed Bio Reactor)
- IFAS (Integrated Fixed Film Activated Sludge)

The EquaReact System Features:

- Diffused aeration (coarse, fine, or ultra-fine bubble)
- Surface or submersible mixing
- Jet aeration mixing and pumping via EquaJet®
- Nitrate and Anoxic recycle systems
- Process monitoring and integrated controls
- Complete process instrumentation

Why EquaReact for Municipal Wastewater?

The EquaReact system allows municipal owners to uniformly equalize and treat wastewater flows over a 24-hour diurnal period by starting the treatment process in the equalization tank.

The system also provides stormwater inflow equalization at municipal wastewater treatment plants without aeration, avoiding consumption of the carbon source needed for biological treatment.

Additionally, the EquaReact system provides municipalities the ability to handle spike influent loads from industrial dischargers.

Why EquaReact for Industrial Wastewater?

The EquaReact system allows industrial owners to uniformly equalize and treat wastewater flows over a 24-hour period, 7 days a week.

The EquaReact system provides treatment starting in the flow equalization and spreading it out over a 7-day/24-hour period. Since industrial wastewater treatment plants have daily operational flow patterns and loading rates it is beneficial to smooth out these fluctuations. The operational patterns are typically higher flows and loads during daytime processing shifts, lower flows and loads during nighttime clean-up shifts, and little or no flow and load during weekends and holiday shut-downs.

Typical Problems with Equalization:

- Reduction of BOD and impact on Biological Nutrient Removal
- High construction costs
- Long term O & M costs
- Odor problems
- Issues with scum and solids deposition

The Solution – The EquaReact® System:

- Allows influent flows to be equalized while maintaining influent BOD as a carbon source
- Utilizes equalization volume as reactor volume to save on capital cost (no need for separate tanks or additional pumping)
- Reduces the size of downstream reactor tanks
- Can be designed to provide both anaerobic/anoxic conditions for biological phosphorus and nitrogen removal
- Minimizes surge flows and maintains steady flow to clarifiers, improving performance
- Minimizes shock loadings, allowing for steady chemical dosages
- Eliminates spike loads from industrial dischargers
- Eliminates odors associated with raw influent equalization

In short, your facility will realize:

- Increased system performance and treatment efficiency
- Much smaller footprint
- Reduced capital and operational costs
- Reduced energy consumption

Operational Value of the EquaReact® System:

The operation and efficiency of biological nutrient removal (BNR) systems is affected by variable wastewater inflow rates and pollutant loading rates that occur daily in municipal and industrial wastewater treatment plants. EquaReact® provides a very cost effective and efficient solution to these issues that enhances performance.

Municipal wastewater treatment plants have typical daily diurnal inflow patterns and pollutant loadings throughout the day. Industrial wastewater treatment plants have typical daily inflow patterns and pollutant loading rates that vary based on the shift operation pattern. These variable wastewater influent flow rates and pollutant

Applications

- Municipal and Industrial wastewater flow
- Combined municipal and industrial flows
- New treatment facilities
- Plant expansions
- Plant BNR or ENR upgrade (Bio P and TN reduction)
- Plant upgrade (flow and load equalization)
- Retrofit into existing facilities

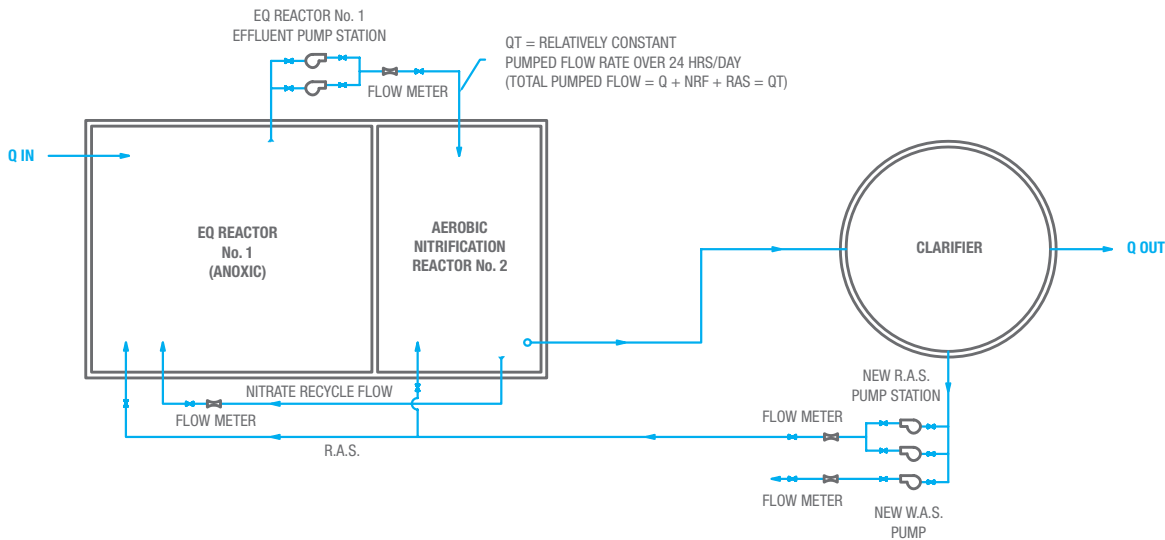
loading rates make a BNR system more difficult to design and operate. Therefore, EquaReact was developed to provide a combined approach to treatment and flow equalization to enhance the BNR performance of the treatment plant. Typically, a treatment plant requires automatic control and pacing of pumping, aeration, and chemical feed equipment based on the wastewater inflow rate and other process control parameters. Wide swings in diurnal flow rates and pollutant loadings impact the design of BNR process reactors, clarifiers, pumps, and other equipment. EquaReact will allow operators to manage and control their influent flows more productively and effectively increase the performance of their downstream treatment system.

In order to reduce the negative impact of variable wastewater inflow rates and pollutant loading rates, equalization basins are used to store, blend, and equalize variable wastewater influent flows and loads upstream of the BNR treatment process units. Storing raw wastewater in an equalization basin can produce odors unless the basin is operated with aeration to transfer oxygen into the wastewater. Aeration of the equalization basin results in the reduction of the carbon source in the raw wastewater, which is needed in the downstream BNR process for biological denitrification and phosphorus removal.

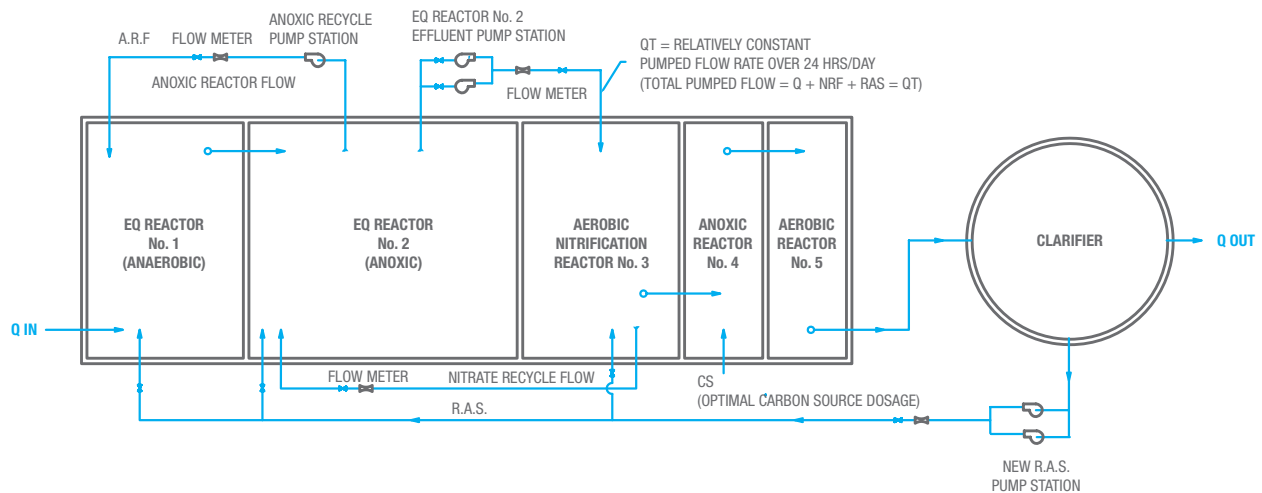
EquaReact® is a patented system that allows operators to manage and control influent flows through equalization, provide treatment, and eliminate odors while maximizing the raw wastewater carbon source all in one basin.

Examples of EquaReact® Multi-Stage Applications:

EquaReact® 2 stage MLE Anoxic/Aerobic process diagram example



Bardenpho Diagram for EquaReact® 5 stage BNR and enhanced Bio P Removal



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