

## BioCycle™ – Technology

### Key Benefits

- Advanced wastewater treatment and reuse effluent concentrations (BOD, COD, NH<sub>3</sub>, TN, TP)
- Sophisticated control algorithms for optimized treatment
- **BioM<sub>x</sub>** mixing benefits included
- Minimized electrical consumption
- Greatly reduced maintenance
- Numerous treatment process applications

### Introduction

An innovative mixing technology (Bio<sup>M<sub>x</sub></sup>), firing programmed bursts of compressed air (or nitrogen gas), combined with diffused aeration, and a sophisticated process control strategy provide the basis for BioCycle™ by EnviroMix. Advanced wastewater treatment and reuse objectives (BOD, COD, NH<sub>3</sub>, Total Nitrogen, Total Phosphorus) are met and optimized using BioCycle™.

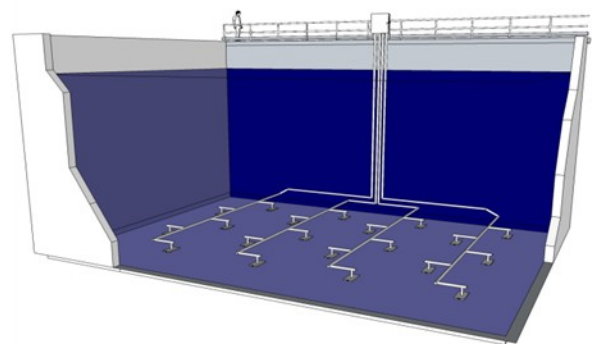
All BioCycle™ installations include process tank mixing by firing intermittent short bursts of compressed air (or nitrogen gas) through tank floor-mounted engineered nozzles. Standard firing parameters of 0.5 second duration at 4.0 to 5.0 second intervals provide proven, effective mixing. The relatively small amount of expanded gas produces an array of large buoyant bubbles to completely mix the process tank. Insignificant gas transfer occurs from the large rising bubbles that mix the process tank. Virtually all electrical power consumption is limited to the compressed air

source (and nitrogen gas generator, if required). One should expect a 60% power savings versus the leading submersible mechanical mixer.

The BioCycle™ system uses sophisticated control algorithms to determine aeration requirements, mixing intensity, intermittent cycling frequency/duration, internal process tank recycles, activated sludge return rates, sludge wasting rates, and chemical feed rates. Process instrumentation such as oxidation reduction potential (ORP), dissolved oxygen (DO), total suspended solids (TSS), ammonia, nitrate, pH, sludge interface level, flow and temperature meters may be used to achieve the desired effluent quality.

### Anaerobic/Anoxic Processes

Due to the insignificant gas transfer to the wastewater using Bio<sup>M<sub>x</sub></sup>, the BioCycle™ system may easily be optimized for biological phosphorus release, denitrification, and alkalinity recovery. Recycles are controlled through the BioCycle™ control system.

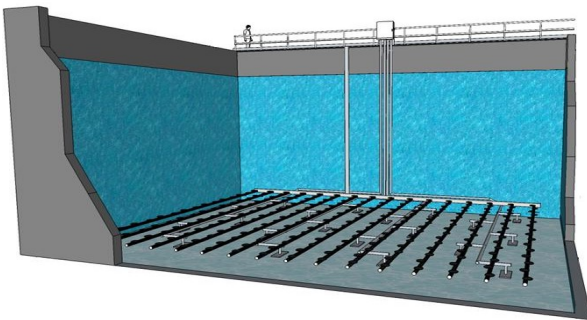


Gas supply piping connects control solenoid valves (in control panel external to tank) to nozzle headers and respective floor-mounted nozzles.

# BioCycle™ – Technology (cont.)

## Oxic/Aerated Processes

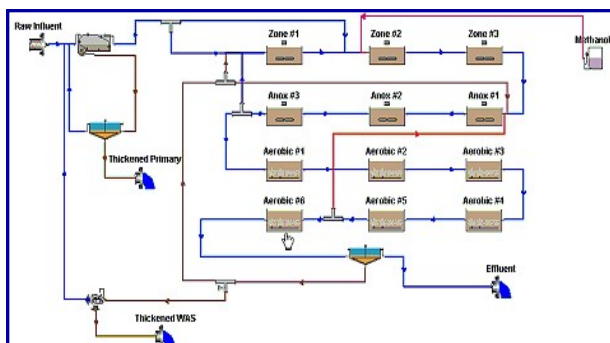
The combination of Bio<sup>M</sup>x with diffused aeration may be used for efficient DO dispersion as well as separation of mixing from aeration. Desired DO and ORP levels may be targeted, minimizing aeration blower usage and power consumption. Intermittent cycling, creation of swing reactors, and simultaneous nitrification/denitrification may be performed through BioCycle™. Recycles, return rates, and sludge wasting are all controlled through the BioCycle™ control system algorithms.



BioCycle™—Integrated Bio<sup>M</sup>x™ with Diffused Aeration

## Example Processes

- Intermittent cycling activated sludge
- Modified Ludzak- Ettinger (MLE)
- Combined Nitrification/Denitrification
- Separate Stage (Sludge) Denitrification
- Main/Side-Stream Phosphorus Removal
- Combined TN/TP (5-Stage, UCT, VIP)  
*also*
- Aerobic/Anaerobic Digester Optimization



Process Model Example

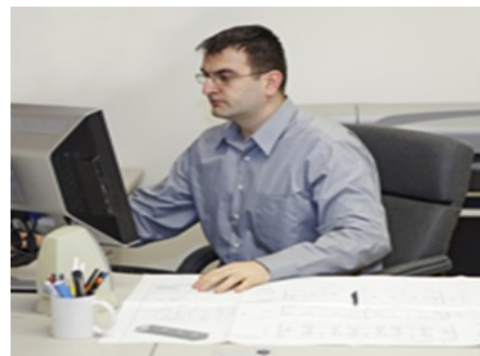
## Chemical Feed

Chemical addition is performed to supplement alkalinity and precipitate phosphorus. Feed location(s), rates, and specific type of chemical used are dependent on a number of factors. EnviroMix will work with you to determine the optimal solution to achieve the desired result.



## Process Engineering Support

EnviroMix engineers are ready to support your wastewater treatment project, whether it be greenfield, upgrade, or retrofit. Our experience in wastewater treatment enables EnviroMix to provide the most advanced and practical solutions at the lowest life-cycle cost.



## Contact Your Local Representative