



**Aeration  
Industries**

## **AIRE-O<sub>2</sub> Bio-ffilm™** Fixed Film Media System

### **Achieve Year-Round Ammonia Removal and BNR Using In-Situ Fixed Film Media**

Aeration Industries' new Aire-O<sub>2</sub> Bio-ffilm™ fixed film media system offers a cost effective wastewater treatment facility upgrade that increases plant performance and capacity by providing year-round nitrification and BNR. The Bio-ffilm system is a submerged attached-growth media process using proprietary fabric technology with a high effective surface area. Our research and development engineers have integrated the media into a treatment system using Aire-O<sub>2</sub> Triton® aerators to establish and maintain biological growth on the media. The aerators are sized and oriented relative to the media arrangement to provide the proper amounts of mixing and aeration for solids suspension, nutrient treatment, and oxygen diffusion. The aerators also maximize treatment kinetics by maintaining higher basin temperatures in cold weather. The system is ideal for municipal wastewater treatment facilities needing upgrades of advanced treatment to meet more stringent EPA requirements or capacity increases.



### **AIRE-O<sub>2</sub> Bio-ffilm™ Fixed Film Media Benefits:**

- The concentrated biomass creates conditions for a high degree of nitrification year-round, even during cold weather.
- All necessary equipment is float-mounted and easy to install directly in existing lagoons, no new construction is required.
- Process is self-regulating and requires no maintenance.
- Dense biomass communities on the fixed film increase Solids Retention Time (SRT) in the system and provide the added benefit of facilitating simultaneous nitrification/denitrification processes.
- Media can also be added to enhance BOD removal.
- Adding Bio-ffilm media decreases F/M ratio which allows for possibility of applying higher influent loadings to the process.
- Circulation of wastewater horizontally in multiple passes through fixed film media channels using Aire-O<sub>2</sub>® aerators maximizes treatment efficiency.
- Fixed film processes are inherently stable and resistant to organic, toxic, and hydraulic shock loadings.
- Adding Bio-ffilm media decreases F/M ratio which allows for possibility of applying higher influent loadings to the process.
- Lagoons can be divided into discrete cells using floating baffles to further optimize process treatment.



*New Bio-ffilm media surface.*



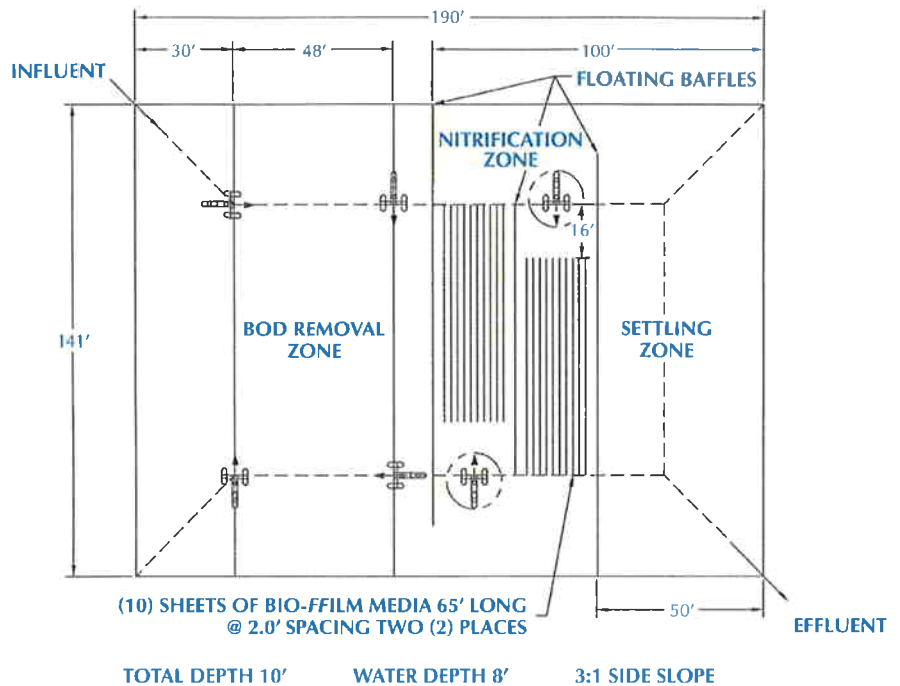
*Bio-ffilm media with  
established biomass growth.*

# AIRE-O<sub>2</sub> Bio-film™ Fixed Film Media System

**Data:** The average design flow of this system is 0.50 MGD. Influent concentrations average 220 mg/l BOD, 220 mg/l TSS, and 30 mg/l TKN.

**BOD Removal Zone:** Treatment zones are established in the lagoon using floating baffle walls to improve the treatment efficiency of the process. The majority of BOD removal occurs in the first cell through standard suspended growth treatment mechanisms. Detention time is 7.9 days. A total of four 5 Hp AIRE-O<sub>2</sub>® aspirator aerator/mixers are installed in this treatment cell. A high mixing intensity is used to accomplish the BOD removal rate. With an approximate effluent BOD of 20 mg/l, flow progresses through an opening in the baffle wall into the nitrification zone.

## Typical Lagoon Design Upgraded with Bio-film System



**Nitrification Zone:** The raw wastewater ammonia in the first cell is approximately 25 mg/l NH<sub>3</sub>-N. Since the BOD load needs to be treated before nitrification can efficiently occur, there is minimal nitrification in the first cell. The majority of the nitrification occurs in the second cell with the help of the aerators and fixed film media consisting of two 3 Hp AIRE-O<sub>2</sub>® aspirators and two media arrays of 10 sheets of fixed film media per array. The fixed film in combination with the aerators creates the perfect environment for the nitrifiers, which favor attached growth treatment mechanisms. The aerator and media array combinations are arranged in a circular pattern to facilitate multiple passes of the wastewater through the Bio-film channels, maximizing treatment efficiency. Detention time is 2.3 days. Flow progresses through an opening in the baffle wall into the settling zone.

**Settling Zone:** The third cell is used for settling the TSS and biological solids prior to effluent discharge. The detention time in the third lagoon is 2.1 days, which helps to minimize algae growth. The result is a high quality effluent achievable on a year round basis averaging 20 mg/l BOD, 20 mg/l TSS, 1 mg/l NH<sub>3</sub>-N (summer), and 4 mg/l NH<sub>3</sub>-N (winter).



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