

# SUCCESS STORIES

AQUA-AEROBIC SYSTEMS, INC.



FROM PRETREATMENT... TO REUSE

**PLANT NAME/LOCATION:** Keegan Bayou WWTP/Biloxi, MS

**TYPE OF PLANT:** Municipal/Domestic

**DESIGN DAILY FLOW:** 10.0 MGD (37,854 m<sup>3</sup>/day) **PEAK FLOW:** 17.0 MGD (64,353 m<sup>3</sup>/day)

**AQUA-AEROBIC PRODUCTS:** Four-basin AquaSBR<sup>®</sup> System

## THE AQUASBR<sup>®</sup> SYSTEM WAS THE ONLY SBR TECHNOLOGY TO ACCOMMODATE KEEGAN BAYOU'S SMALL FOOTPRINT REQUIREMENT!

Millions of people visit Biloxi, Mississippi for its casinos, beaches, golf courses, and other attractions. Some even visit the city to tour the Keegan Bayou Wastewater Treatment Plant.

The wastewater treatment facility was originally constructed with primary clarifiers and trickling filters in the late 1940's. It was then expanded in the 1960's, the early 1980's, and again in March of 1998. The most recent expansion was prompted by the city's experience of explosive development in the east Biloxi area and by the plant being subject to more stringent effluent regulations. Keegan Bayou remained in full operation during this latest expansion, which was also completed ahead of schedule and under budget.

To accommodate the growing demands on Keegan Bayou's wastewater treatment system, the recent expansion included replacing the conventional secondary treatment process with a state-of-the-art, four-basin AquaSBR system. An AquaSBR system was chosen because of the small footprint it required. Its design also enabled modification and continued use of the facility's existing components. The old trickling filters are now used as equalization basins and the old primary clarifiers are now used as sludge thickening tanks. Construction cost for this expansion was approximately \$12 million.



Only two of the four AquaSBR basins at KeeganBayou are currently needed for operation.



The plant's new AquaSBR treatment process nearly tripled its capacity, from 3.5 mgd to 10 mgd. Keegan Bayou's increased capacity allows it to now serve all of east Biloxi along with an area of casino-hotel chains referred to as "Casino Row". The AquaSBR system will also accommodate the city's predicted future development demands.

**PRODUCTS**

**Aqua-Jet®**  
Surface Aerator

**Aqua-Jet II®**  
Contained Flow Aerator

**AquaABF®**  
Automatic Backwash Filter

**MixAir®**  
Aeration System

**AquaDDM®**  
Direct Drive Mixer-Blender

**AquaSBR®**  
Sequencing Batch Reactor

**AquaDisk®**  
Cloth-Media Filter

**AquaDiamond™**  
Cloth-Media Filter

**AquaDrum™**  
Cloth-Media Filter

**ThermoFlo®**  
Spray Cooler

**Aqua EnduraDisc®**  
Fine Bubble Diffuser

**Aqua EnduraTube™**  
Fine Bubble Diffuser

**Aqua CB-12™**  
Coarse Bubble Diffuser

**Aqua CB-24®**  
Coarse Bubble Diffuser

**AquaMB Process™**  
Multiple-Barrier  
Membrane System

**MSBR®**  
Modified Sequencing  
Batch Reactor

**SERVICES**

Process and Mechanical  
Engineering

Quality Manufacturing

Aftermarket Sales &  
Service

International Expertise

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**AQUASBR® SYSTEM PROCESS**

The AquaSBR system operates on a simple concept of introducing a quantity of waste to a reactor, treating the waste in an adequate time period, and subsequently discharging a volume of effluent plus waste sludge that is equal to the original volume of waste introduced to the reactor. This "Fill and Draw" principle of operation involves the basic steps of Fill, React, Settle, Decant, and Sludge Waste. The system may be designed to include seven individual phases of operation but the inclusion or duration of any individual phase is based upon specific waste characteristics and effluent objectives.

Where nutrient removal is required, a simple adjustment to the SBR's operating strategies permits nitrification, denitrification, and biological phosphorus removal. Optimum performance is attained when two or more reactors are utilized in a predetermined sequence of operation.

**DESIGN CONSIDERATION**

Storm flow management was an important consideration in the design of Keegan Bayou's AquaSBR system since it needs to retain sufficient biomass for subsequent treatment and stay within effluent requirements during peak wet weather events.

In fact, Keegan Bayou has already successfully managed peak flow periods in excess of its design flow. This occurred during Hurricane George, in 1998. Peak flows during the hurricane surpassed 14 mgd, with only two of the four basins in operation! Also, effluent BOD<sub>5</sub> and TSS levels never exceeded permit limits during the storm (average effluent BOD<sub>5</sub> was 4.0 mg/l and average effluent TSS was 8.6 mg/l.)

Predicted future development in the east Biloxi area was also an important factor in the AquaSBR system design chosen for the Keegan Bayou WWTP plant. The design incorporates two additional basins to accommodate future growth demands.

**AVERAGE ANNUAL OPERATING DATA**

Loading	Design Influent (4-basin)	*Current Influent (2-basin)	*Current Effluent (2-basin)	**Bay Permit Effluent
Avg Flow mgd	10	4.5	-----	-----
Peak Flow mgd	17	8.5	-----	-----
BOD <sub>5</sub> mg/l	140	252	6	30
TSS mg/l	156	267	5	30
NH <sub>3</sub> -N mg/l	40	15	1	15

\*Only two of the four basins are currently needed for operation.

\*\*The plant was designed to discharge to Keegan Bayou and meet effluent objectives of 10 mg/l BOD<sub>5</sub>, 30 mg/l TSS and 2 mg/l NH<sub>3</sub>-N. The plant chooses to discharge its effluent to the back Bay of Biloxi and is required to meet the effluent objectives shown in the table above.

**AQUASBR® SYSTEM ADVANTAGES:**

- All components retrievable and accessible
- Tolerates variable hydraulic loads
- Controls filamentous growth
- Tolerates variable organic loads
- Provides quiescent settling
- Separation of aeration and mixing
- Lower installation costs
- Return activated sludge pumping eliminated
- Small footprint
- Simple to expand or upgrade
- One company accountability

During a dedication ceremony held on April 8, 1998, for Keegan Bayou WWTP, Biloxi's Mayor, A.J. Holloway stated, "This is a state-of-the-art plant that will meet our current needs and any foreseeable development in east Biloxi."