

# BREAKING THE BARRIER

~ Allison Blodig, REHS, Manager, Regulatory Affairs and Special Projects, Bio-Microbics, Inc.

## **MBR Technology Applications in On-Site Systems – The Next Generation of Wastewater Treatment Options**

### ***What are “membranes”?***

Membranes are thin barriers or films of material that allow certain substances to pass through them. Nature is full of membranes and our skin is a great example. Our skin is called a semi-permeable membrane.

Semi-permeable membranes allow certain substances to pass through but keep others out. In the wastewater industry we deal with semi-permeable membranes that are synthetic, very thin (100-500 microns thick), and are made from various substances such as polymers, ceramics or other porous materials.

The pore sizing is important when you are talking about membranes and the level of treatment they can deliver. The pore sizing or filtration is described from largest to smallest as: “micro-filtration”, “ultrafiltration”, “nanofiltration”, and “reverse osmosis”.

Most of us have heard of reverse osmosis as a treatment for potable or drinking water systems in our homes. Generally, the smaller the pore size and the dirtier the water the more energy it takes to pull or push water through a membrane and deliver treated water.

The history of MBR technology development then and now!

The term membrane bioreactor or MBR is used in wastewater treatment and defines a combination of a biological process and membrane separation. The first MBR’s used were too expensive to operate because they tried to use too small of pore sizes and it required way too much energy to run them and they had to be cleaned very frequently.

The membranes chosen for wastewater now have the larger pore sizes and are usually micro or ultrafiltration. In addition, they are typically im-

mersed directly in an aeration process and use a high surface area of membrane material.

The wastewater moves from the outside of the membrane to an inside void space and is pulled under a vacuum. By making these kinds of adjustments the costs to operate an MBR became much more reasonable and affordable.

### ***What are the types of membranes that are in use: Advantages and Limitations***

Hollow Fiber, flat sheet and spiral wound are the three most common types of immersed membranes used. The use of hollow fiber membranes allows for a very small footprint. It requires fine screening of the influent wastewater which in turn requires more cleaning. It is also more susceptible to clogging and breakage so it needs more attention. These things make it more suitable for larger plants because of the need for more frequent oversight. Flat sheet membranes have less of a chance for clogging and they have a very robust construction. This makes them an ideal choice for smaller systems and decentralized systems. Spiral wound membranes are still considered to be experimental in the wastewater market.

### ***Treatment Capacity of Wastewater***

Treatment of residential wastewater by an MBR system has the capability to produce effluent with non-detectable TSS; BOD concentration of less than 2 mg/L; ammonia-nitrogen concentration of less than 0.5 m/L; fecal coliform count of less than 20 per 100 mL without additional disinfection using chlorine or ultra violet light (UV).

With proper design, total nitrogen concentrations of less than 5 mg/L can be achieved. An MBR system is also ideal for treating other harmful pathogens and viruses and is perfect for more challenging conditions, such as low temperature environments and treating compounds that are difficult to treat such as pharmaceutically active compounds (PhACs), personal care products (PCPs), and endocrine disrupters (EDCs), which are not typically reduced to desirable levels by

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conventional treatment processes. The MBR effluent can easily be considered for reuse in various applications.

## **Technology application transfers to the Decentralized Industry**

The use of MBR in municipal wastewater treatment has grown widely. This is due primarily to more stringent effluent water quality requirements, space constraints, lower operator involvement, modular expansion characteristics, consistent effluent water quality capabilities, and advances in the membrane technology. In the last 15 years, the MBR technology has extensively been applied to treat both municipal and industrial wastewaters. Currently, there are more than 2,000 small and large (56 MGD) MBR treatment plants in operation in the world.

More recently, MBR technology has made its way into the decentralized treatment industry. A decentralized or onsite system allows for high quality effluent to be produced at an individual home site that sits directly on the water or other environmentally sensitive areas as well as treating larger wastewater flows from clusters of homes or non-residential facilities. It is also very effective on high strength wastewater. To be successful in the this market the system needs to be cost effective and designed to be simple to install, have a minimum number of mechanical devices, be easy to maintain, and automated using a good control and monitoring system.

The first system on the market and approved in Washington is the BioBarrier® by Bio-Microbics, Inc. This modular system can address flow rates ranging from <500 gpd up to 20,000 gpd. It ships ready to install with just a few simple moving parts. The control system is completely automated and it is very easy to maintain utilizing a unique Clean in Place (CIP) procedure. To further enhance the BioBarrier®, Bio-Microbics also offers the TRACK® dialer. TRACK® is an electronic monitoring system used to monitor the operations of any treatment system and notify a responsible management entity of an alarm. This gives and added level of security in the most sensitive of sites. For more information on the BioBarrier® contact Bio-Microbics, Inc. at sales@biomicrobics.com or 800-753-FAST (3278). ■

Ken was an entrepreneur who realized it was important to have WOSSA as part of his business plan. In WOSSA's time of turmoil, he was the only officer who stayed on to support the vote of the board and helped stabilize WOSSA during its reconstruction. His generosity helped make the WOSSA annual conferences a success - and he was always ready for an "apple-tini".

Thanks Ken!

Jer and Suzi Stonebridge



## Product Announcement



**BioBarrier**  
MEMBRANE BIOREACTOR

### A New Generation of Wastewater Treatment Solutions

Bio-Microbics introduces a new generation of wastewater treatment solutions known as the BioBarrier® MBR. The BioBarrier® Membrane Bioreactor (MBR) helps meet the increasingly stringent needs of environmentally sensitive areas. Ideally suited for the unique needs of the decentralized wastewater industry, the BioBarrier® MBR's design allows high quality effluent to discharge into most environments, including surface irrigation and other reuse methods. The ability to do a Clean In Place (CIP) procedure makes it possible to clean the BioBarrier® effectively during routine maintenance. In comparison with conventional treatment techniques; Bio-Microbics' BioBarrier® displays several advantages:

- **Highest Effluent Quality**
- **Robust Biological Process**
- **Smaller Footprint**
- **Simple Operation**
- **Low Sludge Production**
- **Energy Efficient**
- **Nutrient Reduction**
- **Easy Installation**
- **Pathogen Reduction**

To further enhance the BioBarrier®, Bio-Microbics also offers the TRACK® dialer. TRACK® is an electronic monitoring system used to monitor the operations of any treatment system and notify a responsible management entity of an alarm. This gives an added level of security in the most sensitive of sites.

### Reuse, Recycle...Right Now

The BioBarrier® MBR, which received the 2009 Technology Award presented by the Environmental Business Journal (EBJ), The BioBarrier® MBR provides new opportunities for wastewater recycling that will have a dramatic, positive effect on water resources around the globe.

