

## ***Wastewater Treatment Insights for the Pulp and Paper Industry***

**2009 Number 1**



Consulting Services



Laboratory Services



Wastewater Training



Biological Products



Nutrient Blends

### **An update on EBS**

It's been many years since we produced our Clean Thoughts newsletters in 1999 and 2000 and things have certainly changed for EBS during that time. We are pleased to start this tool back up and hope the information you glean here will help your mill run more efficiently and cost effectively not only in smooth times but when you need to troubleshoot upsets.

Times are tight, plants are cutting back, and costs are rising—not a pleasant environment. But one area EBS takes pride in is our focus on wastewater treatment, particularly the biological process, and our expertise in that area. All the client support functions that EBS performs revolve around the eight growth pressures that affect the microbial

community. Some we can impact, others such as temperature we cannot (sorry Northerners but your bugs have another month or so of winter). But those we *can* impact can have a tremendous influence on how the biological system effectively removes BOD and produces the desired effluent quality. Thus, it's important that the biological process runs efficiently in smooth operating times so that when an upset occurs, the system can handle the problem more effectively

These growth pressures and how mill personnel can influence them are covered in EBS's wastewater training seminars and the books "*Aerated Stabilization Basins for Pulp and Paper Mills*" by Foster and Klopping and "*Activated Sludge Operations*" by Klopping. However we will also cover them in our newsletters. So sit back, enjoy the newsletter, hopefully learn a little, and laugh when you read Mike's Trivia Questions. And please send us feedback on topics you are interested in.

Best wishes,

*Christine Foster, General Manager*



#### **Trivia Questions:**

1. Approximately how much BOD<sub>5</sub> is removed by one 75 horsepower surface aerator?
2. True or False – Filamentous bacteria are excellent BOD<sub>5</sub> degraders.
3. On Gilligan's Island, what was Ginger's last name?
4. Sheriff Andy Taylor first appeared on what television show?
5. And if you can't figure it out by now, what is Mike Foster's favorite channel on Cable TV?
6. True or False – Mike Foster never smiles for pictures. (For help, see p. 3.)

#### **In This Issue**

- ❖ An update on EBS
- ❖ Ask the Biowizard: Dealing with nutrient costs
- ❖ Name that Bug
- ❖ EBS Seminar date set
- ❖ Employee Spotlight: Mike Foster
- ❖ Bioaugmentation: BAC Units

## Ask the Biowizard™: Questions posed by mill personnel

### ***Nutrient addition has become so expensive, it is busting my budget. What can I do?***

First, let's make sure we understand why nutrients (nitrogen and phosphorus) are important. These two macronutrients are critical building blocks for bacterial growth and reproduction, as well as energy transfer. Just as people require a balanced diet including vitamins and minerals, bacteria require nitrogen and phosphorus at a certain ratio in order to reproduce quickly and degrade food (BOD) to the best of their ability in the conditions they live within. While the importance of nutrient availability for optimum wastewater system performance is generally well accepted, we continue to develop techniques and strategies for optimizing nutrient application rates without compromising system performance.

There are several approaches that EBS has utilized to assist our clients in optimizing performance while reducing nutrient cost. In general, we take a holistic approach that may include some or all of the following components:

- Data evaluation, including BOD loading, nutrient balance, and nutrient application rates
- Development of a loading-based feed rate model
- Dosage and N:P ratio optimization using respirometry
- Determining the best application point to avoid loss from volatilization or precipitation
- Improve analytical approaches at the mill
- Installation of improved metering pumps
- Utilization of continuous bioaugmentation (See BAC Unit article) to reduce reliance on nutrients
- Routine analyses by EBS specialists on-site or in our laboratory

Since 2002, EBS has worked with over thirty pulp and paper mills to optimize their nutrient programs. Mike Foster has given numerous presentations and participated in several panel discussions on the subject at both TAPPI and NCASI meetings. If you would like to know more about nutrient optimization and the EBS approach, contact us at (985) 674-0900.

## Employee Spotlight

### ***Michael Foster, Principal Consultant***

Mike Foster is President and Principal Consultant for Environmental Business Specialists, LLC (EBS) in Mandeville, LA. Founded in 1997, EBS provides consulting, training and technical support in the area of biological wastewater treatment to industrial wastewater treatment systems, primarily in the pulp and paper industry and to several major specialty chemical suppliers to the P&P industry.

Mike has a BS in Chemistry and an MS in Instructional Technology. His Masters project was a web-based training course for P&P mill ASBs. Mike is a Certified Environmental Trainer (CET) in wastewater from the National Environmental Safety and Health Training Association (NESHTA) and holds a Class IV Wastewater Operator Licenses in MS, LA, and AR.

Mike began his professional career in 1980 as an Environmental and Quality Control Chemist and later as an R&D Chemist. From 1984 through 1996, Mike worked for a major water treatment company. He held various technical and marketing positions, including overseeing the company's bioengineering group.

Mike joined TAPPI in 1992 and has served as Chairman for the TAPPI Biological Wastewater Workshop since 2000. In 2007, Mike received the Roy F. Weston Award for Outstanding Technical Contributions to the Environmental Division of TAPPI.

Since 1998, EBS has sponsored twelve biological wastewater workshops for industrial WWT that were attended by approximately 200 professionals. Mike has authored numerous articles and papers on a variety of topics including nutrient optimization, activated sludge process control, bioaugmentation, and micronutrient technology. He co-authored with Paul Klopping "*Aerated Stabilization Basins for Pulp and Paper Mills*," a comprehensive manual on the operation and optimization of these common wastewater treatment systems in the pulp and paper industry.



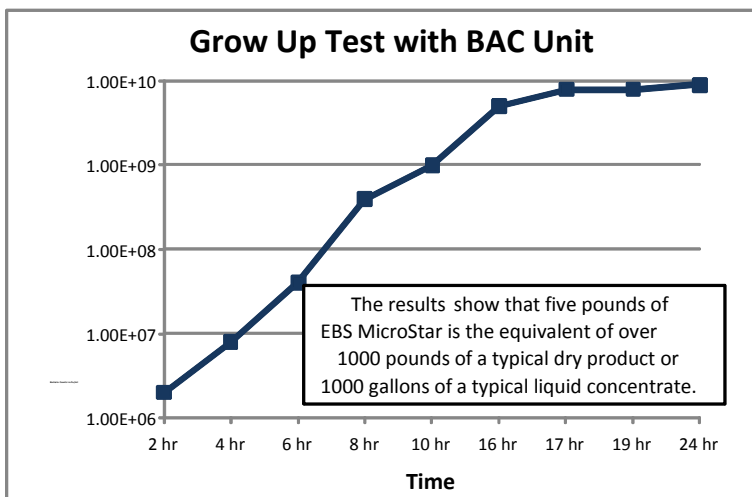
## Bioaugmentation: BAC Units



Commercial bacteria have been used for almost thirty years to address a myriad of wastewater problems including poor BOD reduction, excessive solids carryover, problems related to toxic materials, and odors. Products were applied in various forms, including powders, liquid concentrates, solids blocks, and even crop dusted over the pond. In each case, the amount of bacteria added is based on the manufacturer's specified concentration, usually reported as cfu (colony forming units or bacteria) per milliliter or gram. Consequently, the cost effectiveness of the product applications is often less than desirable. However, bacterial products offer the customer one feature no other chemical additive does—the ability to multiply on-site prior to application.

By utilizing specially formulated bacterial blends and growth media cultivated in a patent-pending Bacteria Acceleration Chamber (BAC Unit), the amount of active cultures applied can be increased 100 – 1000 fold. The result is a greater chance of success at an affordable cost.

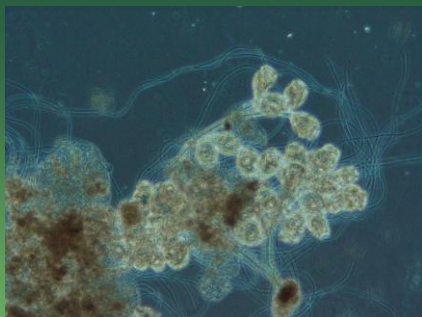
**The Products:** EBS produces a line of custom formulated bacterial blends specifically designed for on-site grow up. These products contain selected bacteria blended with growth media and micronutrients designed to address the toughest wastewater problems. Not just bugs and bran, EBS MicroStar™ and BioStar™ formulations are the result of four years of R&D focused on producing a product that can be “grown up” on site. The result is a product that multiplies up to 1000x in 24 hours.



**The Feed System:** EBS BAC Units are the most efficient bioaugmentation application system available. The unit can feed dosages ranging from 1 - 25 pounds per batch. Up to two batches per day can be produced. The units are fitted to be automatically or manually dumped into the pond, a customizable feature.

**The Result:** More bacteria entering the aerated section of the pond means higher BOD removal rates. Since less bacteria are being initially used to create the population, cost savings are immediately seen. As they say, the proof is in the pudding. EBS has many examples of this successful application.

## Name That Bug



Answer on page 4.

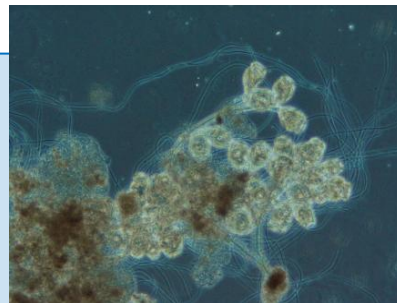
The EBS 13<sup>th</sup>  
Industrial Wastewater  
Treatment Seminar

April 28<sup>th</sup> – April 30<sup>th</sup> 2009

## Name That Bug ... Colonial Stalk Ciliates *Zoothamnium pygmaeum*

Stalked ciliates can be seen in single organism form or can grow in colonies like the picture on page 1. Each “head” in a colony of stalked ciliates is considered one organism. Therefore, when counting higher life forms for maturity index calculations every organism is counted in the colony. Colonies can range from three to over three hundred organisms each. Stalked ciliates usually attach themselves to a piece of floc or inert material but can occasionally be seen moving through the water, with or without the stalk. Centrifuging a sample for observation can break the stalk off. Each species resembles a tulip or tube shape with cilia (small hairs) around the opening. The cilia trap bacteria, which are used as a food source, by creating a current that moves the bacteria toward the opening. The stalk ciliate then contracts in a quick motion, which pushes the food into the body where it can be utilized.

Stalked ciliates usually indicate a stable, healthy system with a moderate to high maturity index. Because stalked ciliates attach to pieces of floc, they usually imply that the biomass (bacteria) is forming well structured floc that is essential to settling and good effluent quality. However, one stalked ciliate, *Vorticella microstoma*, is often indicative of high turbidity and poor effluent quality. This is because they consume single bacteria cells in open water which means dispersed bacteria are present and turbidities are elevated. But, this particular stalked ciliate has a very small mouth opening compared to other species which enables them to be identified fairly easily.



## TRIVIA ???

### Answers:

1. 3000 pounds per day.
2. True. While filamentous bacteria can cause serious settling problems and high effluent TSS, they are generally excellent BOD<sub>5</sub> degrading organisms.
3. Grant.
4. The Danny Thomas Show. Andy stopped Danny Thomas for speeding as he drove through Mayberry.
5. Of course, TV-Land.
6. Are you kidding? He says he doesn't know how to smile for a camera. We're lucky we got a slight grimace for this photo.

**How many did you get correct?**

**CLEAN**

**THOUGHTS**

*Wastewater Treatment  
Insights for the Pulp and  
Paper Industry*

P.O. Box 1936  
Mandeville, LA 70470  
Phone: (985) 674-0900  
Fax: (985) 626-0067

[tranchina@ebsbiowizard.com](mailto:tranchina@ebsbiowizard.com)

We would like to hear from you. If you have any questions or comments, or would like to ask the Biowizard a question, please contact us by phone, fax, or email.