

Clean Thoughts

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MESSAGE FROM THE CEO

MIKE FOSTER



Dear clients:

When I started EBS as a one-man consulting company, I could not have envisioned that one day I would be surrounded by ~40 talented and dedicated employees providing unique products and services to almost 100 pulp and paper mills in the US and Canada. And yet, here we are. January 31, 2022 marked the 25th Anniversary of EBS. This anniversary was preceded in December 2021 by Christine and I transferring a majority ownership to the employees via an Employee Stock Ownership Plan (ESOP). Our goal is to create an enterprise that will remain a valuable resource to the pulp and paper industry for many years to come. By maintaining EBS as an independent, employee-owned company, we can ensure that we will be true to our past by continuing our journey as a responsive, nimble, impactful, transparent, and innovative organization.

During the very early years of EBS, Christine and I created a newsletter for our pulp and paper clients. We named it Clean Thoughts, and it was old school - one color printing with B&W photos, releasing six issues in 1999 and 2000. A few months ago, I dug through the filing cabinet (a large steel box with hundreds of folders full of old, often irrelevant documents) and found copies of the original newsletters. I had to explain to my younger employees what a B&W photo was and why only one ink color was used. They thought the concept was pretty cool, and decided to resurrect Clean Thoughts. We hope you enjoy this newsletter, which we want to be both informative and entertaining.

FIVE KEY AREAS TO IMPROVE YOUR WASTEWATER SYSTEM

WASTEWATER OPERATION IS A COMPLEX PROCESS. HERE ARE FIVE KEY AREAS THAT WILL MAKE A DIFFERENCE IN YOUR SYSTEM.

1. MONITOR THE EIGHT GROWTH PRESSURES

The growth pressures are the factors that often determine the success or failure of a biological treatment system. These factors include BOD or loading, retention time, dissolved oxygen, temperature, pH, activity of the biomass, the presence of toxic or inhibitory compounds, and nutrients. Keeping these growth pressures in their respective target range is essential for maximizing treatment efficiency.

2. GENERATING RELIABLE LABORATORY DATA

It is generally understood that “you can’t control what you don’t measure.” Laboratory generated data is still the best or only tool for measuring and tracking key wastewater parameters. If that data is inaccurate or inconsistent, the consequences can be significant in terms of unnecessary expense of time and money, and even loss of production or permit non-compliance. Ensuring that your on-site laboratory generates reliable data is a critical component to better understanding your wastewater treatment plant (WWTP).

3. ESTABLISH KEY PERFORMANCE INDICATORS

After ensuring that you can produce reliable data and know what to test for, establishing Key Performance Indicators (KPIs) is an ideal next step. KPIs (which are often site-specific) allow you to set “guardrails” for the most important parameters in your WWTP. KPIs typically include things like influent loading, flow, COD removal across an aeration basin, nutrient residuals, dissolved oxygen levels in an aeration basin, or clarifier turbidity. From this baseline, high and low guardrails can be set. These guardrails can be used to

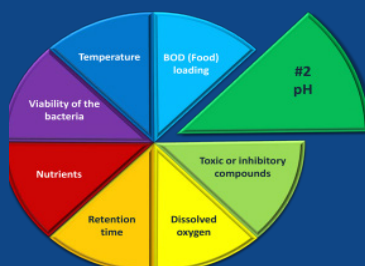
instantly understand where operations stand. After establishing guardrails, putting solid corrective actions in place for each KPI will help you resolve issues more quickly. Having a plan in place for situations like this before they happen allows you to be proactive rather than reactive and prevent small upsets from becoming big problems.

4. WELL TRAINED OPERATORS

Established KPIs are essential for engineers to analyze WWTP efficiency, but the operators are the front line of defense. They should not only be well trained in the technical aspects of operating the equipment, but also in what their KPIs are telling them. If COD values rise above X, do the operators understand what levers they can pull? If nutrient levels fall below the given guardrail, what should the nutrient pump rate be increased to? Why does the DO need to remain above 2 mg/L, and what does it mean if it suddenly plummets? The operations staff must be just as informed as the engineers on what the growth pressures and KPIs are telling them, and what options they have at their disposal to affect change.

5. CREATE A MONITORING PROGRAM

At times, all systems have issues that can’t be easily solved using a traditional monitoring approach. Having a routine monitoring program at your disposal can be a useful safety net. This may consist of routine data analysis, microbiological testing, or on-site consulting or a variety of other measurements that help ensure your system is performing at it’s best. EBS has worked with many facilities over the past 25 years to ensure their employees are well trained, know how to spot unreliable data and know how to take corrective actions when unavoidable upsets occur.



THE EIGHT GROWTH PRESSURES

1. BOD or loading
2. Retention time
3. Dissolved oxygen
4. Temperature
5. pH
6. Activity of the biomass
7. Inhibitory compounds
8. Nutrients

TEACHNOLOGY CORNER

UNMANNED SURFACE VESSEL (USV) USED TO CONDUCT HYDROGRAPHIC SURVEYS

EBS uses an Unmanned Surface Vessel (USV) to conduct Hydrographic Surveys (for our wastewater clients) in different bodies of water from clean water to wastewater. EBS can provide data across water bodies not traditionally considered accessible by utilizing a remotely operated vessel to conduct a survey. Water bodies once considered hazardous to access, are now able to be surveyed safely by field personnel remaining ashore. The USV's lightweight makes it easy to be placed into elevated or lowered structures, eliminating the safety concern of having a person in either of these scenarios.

The USV is equipped with a single beam echo sounder optimized for shallow water hydrographic surveying and a dual-frequency transducer that provides high-resolution sonar imagery. Our field personnel are trained to use the industry-leading hydrographic survey software to develop a detailed 3D model, bathymetric map, or a cross sectional diagram of the scanned areas. Routine surveys can



provide a detailed look at sediment accumulation over time and provide the data necessary for planning capital projects. Surveys can also be used to compare depth before and after capital projects to assess progress and establish the baseline. By taking advantage of the new USV equipment and software, EBS can maximize performance, perform advanced data evaluations, safely conduct studies in a variety of water depths, and continue to provide our clients with high-quality deliverables. If you are interested in more information regarding a hydrographic survey or would like to schedule one, [contact us](#) today!

SPOTLIGHT ON ALLIANCE PARTNER

TIM MOORE

The EBS "Alliance for Compliance" approach was formed to give you a high level of personalized service from a local company while providing you with access to broader resources. Each Clean Thoughts issue will spotlight one of our alliance partners. In this issue, we would like to introduce you to Tim Moore, President of Risk Sciences.

Mr. Moore founded Risk Sciences in 1986 and is one of the nation's foremost experts in Whole Effluent Toxicity (WET) testing. During his 35-year career, Mr. Moore's ground-breaking work on the proper interpretation of unusual dose-response data became the basis for the US EPA's national guidance on the same subject.

Mr. Moore has partnered with EBS to help clients identify the cause(s) of toxicity test failures and restore wastewater treatment plants to full compliance with the discharge permit.



This Issues Trivia Questions:

1. Which of the eight growth pressures can be hardest to control?
2. True or false – Filamentous bacteria are excellent BOD₅ degraders.
3. Which test is a commonly used surrogate for the BOD₅ test?
4. What do you call an organism that obtains energy and nutrients primarily or entirely from the consumption of bacteria?
5. What is the tiny piece at the end of a shoelace called?

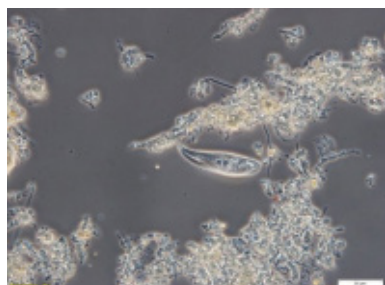
KNOW YOUR BUGS

THE CILIATES

Microscopic examination is an important process control tool for both activated sludge systems and ASBs. By monitoring the diversity and the quantity of various indicator organisms, one can obtain valuable information regarding the overall health and stability of the biological population.

Ciliates are protozoans and typically range in size from 40-150 μm depending on the species observed. They feed on bacteria, not dissolved organics, and aid in improving the effluent quality. Their presence is usually an indication of well oxygenated conditions, low loading, and the absence of toxic or inhibitory conditions.

Of the ciliate population, there are free-swimming ciliates, crawling ciliates, and stalked ciliates.



Free-swimming ciliates have cilia covering their surface, which makes it easy to spot during a micro exam.



Crawling ciliates have cilia dominating one side of their body and can be found crawling around floc particles scavenging on the bacteria



Stalked ciliates are typically found attached to floc pieces with a long stalk.

ASK THE BIOWIZARD QUESTIONS:

HOW DOES SUMMER HEAT EFFECT FILAMENTOUS BACTERIA?

As temperatures rise, filamentous organisms can also grow more rapidly and then die off when temperatures peak mid-summer. Historical experiences with high-temperature filamentous growth in pulp and paper and pharmaceutical-activated sludge wastewater treatment systems suggest that filamentous growth rate increases up to temperatures of 35°C (95° F).

When the temperature reaches between 35 and 40 °C, (95-104°F) filaments become stressed and grow in a more dispersed state. This often results in higher levels of free-floating filaments in the bulk water rather than attached to floc. These filaments have the potential to be carried over the secondary clarifier weirs and reduce the quality of the final effluent.

JENKINS, D., M. G. RICHARD AND G.T. DAIGGER, MANUAL ON THE CAUSES AND CONTROL OF ACTIVATED SLUDGE BULKING AND FOAMING, 2ND ED., LEWIS PUBLISHERS, BOCA RATON, FL, 1993; 3 RD ED., 2003



Trivia answers:

1. **Temperature:** As much as we would love to control the weather, mother nature has a mind of her own. Which is why routinely monitoring your system, especially during seasonal changes, can help detect issues before things go awry.
2. **True:** While filamentous bacteria can cause serious settling problems and high TSS, they are generally excellent BOD₅ degrading organisms.
3. **Soluble COD:** Soluble COD is the most popular alternative test to BOD for predicting the concentration of organic matter in a WWTP. Each facility's COD:BOD correlation will be unique, so spending the time to understand this relationship is essential.
4. **A bacterivore.**
5. **An aglet.**

MAKING A DIFFERENCE

YOUTH SERVICES BUREAU - CHEF SOIREE FUNDRAISER 2022

EBS employees and its affiliates have a strong culture of giving. The company is a strong proponent of giving back to the community and encourages community support by organizing company-wide charitable endeavors as well as promoting individual activities.

For the past 16 years, EBS has sponsored the Youth Service Bureau's Chef Soiree, the major fundraiser for this organization. The Youth Service Bureau is a private, non-profit organization dedicated to the belief that strong youth and families are the cornerstones of a strong community. The mission of the Youth Service Bureau is to provide advocacy, counseling, education, and intervention for at-risk youth and their families, helping them reach their full potential.



SPECIALIZED TRAINING PROGRAMS OFFERED

Training is a passion for EBS. Our goal is to grow individual knowledge and skills so operators can manage the system more efficiently and effectively resulting in minimizing the wastewater system's impact on the environment.



1. WEBINAR - Nitrification & Denitrification Online - August (TBD)



2. WORKSHOP- Biological wastewater treatment, Data interpretation, etc. Birmingham, AL- July 20-21st



3. WEBINAR - Fecal Testing Online - September (TBD)



4. SEMINAR- Aerated Stabilization Basins (ASB) and Activated Sludge Systems Mandeville, LA - October 11-13th

We want to hear from you! For more information regarding upcoming training programs, operational issues at your facility, request a specific article topic, or want to participate in our "Ask the BioWizard" questions, please contact us by phone, email info@ebsbiowizard.com or through our [Contact Us form](#) located on our website.



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