



# It's Time to **Rethink** Biostimulants

Probiotic Solutions® Wastewater Treatment with MICRO CARBON TECHNOLOGY™  
Proven & Effective Since 1989

## A Powerful and Proven Strategy to Cut Wastewater Treatment Costs

There are many wastewater treatment plants whose microbes are starving - suffering from nutrient deficiencies. As a result, operational problems arise with inefficient waste stabilization. Signs of nutrient deficiency include: sludge bulking, foaming, poor settleability, inefficient removal of suspended solids, excess sludge accumulation, and inefficient removal of BOD<sub>5</sub> and COD. (Wastewater Biology; The Life Process, WEF, 1994)

Laboratory studies on a range of effluents have established that industrial wastes are not nutritionally balanced for optimal wastewater treatment. (Wheatley et al., 1988)

Wastewater microbes need adequate nutrition to thrive, metabolize, grow, and pass their genes to the next generation. This happens more or less efficiently in wastewater treatment plants depending on the condition of the wastewater to be treated.

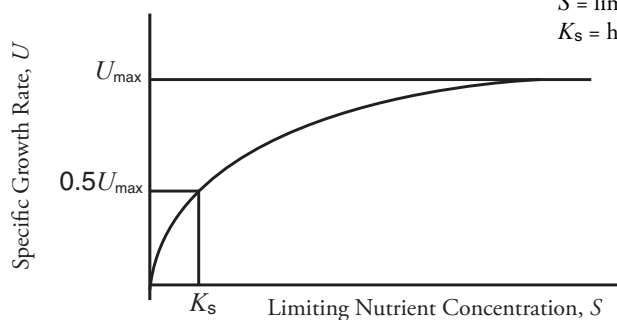
Each microbe has a specific function to perform to further nutrient cycling and Nature's own "self purification" cycle. Each mineral and vitamin essential to the growth and metabolism of the microbe also has a unique and specific function to perform. When a nutritional deficiency occurs in the reactor of a wastewater treatment plant, metabolic inefficiencies set in and wastewater treatment effectiveness suffers with problems like foaming, bulking, poor settleability, and excess solids accumulation.

The influence of limiting nutrients applies to aerobic and anaerobic wastewater treatment plants alike. "In nutrient limited activated sludge plants the effluent BOD concentration can be several times higher than in nutrient balanced systems". (Grau, P, 1994). In anaerobic systems, trace nutrient deficiencies will lead to increased volatile fatty acids which depresses pH, increases BOD, and solids accumulation, and severely limits the overall treatment efficiency. "...Adequate trace metal bioavailability and sulfide presence must always be guaranteed for anaerobic biotransformation of wastewater. Every case of elevated volatile acids in an anaerobic effluent should be considered a potential case of trace metal deficiency..." (Speece, R.E., 1996)

Nutritional deficiency in a wastewater treatment plant is expressed by this simple Monod Equation: 
$$U = U_{max} \frac{S}{K_s + S}$$

The influence of a single limiting nutrient:

$U$  = specific growth rate;  
 $U_{max}$  = maximum specific growth rate, d<sup>-1</sup>;  
 $S$  = limiting nutrient concentration, mg/l; and  
 $K_s$  = half saturation constant, mg/l.



**When nutrients are deficient  
growth rate becomes limited**

(Source: Rich, L.G., 1999)

Where proper nutrition exists, a wider variety of different microbial species will work together to further efficient nutrient cycling for more complete stabilization of waste. "Limiting or deficient [nutrient] concentrations may shift the population in favor of those organisms requiring less of the element or those organisms more capable of assimilating trace elements in extremely dilute solutions". (Wood & Tchobanoglaus, 1995) Nutritional deficiencies will lead to operational problems like bulking, foaming, poor solids removal, and inefficient BOD<sub>5</sub> removal.

# It's Time to **Rethink** Biostimulants

Optimizing the microbial growth environment by the addition of trace nutrients and vitamins is the most cost effective way to double treatment plant efficiency. Small nutritional changes to the growth environment will release more of the microbes full potential and send dramatic changes throughout the entire treatment system. "Trace metal supplementation is [no longer] a scientific anomaly; it is an engineering necessity, as evidenced by numerous field studies... Trace metals exert a surprisingly critical influence upon successful methanogenesis, so the data illustrating this indispensable factor should be considered." (Speece, R.E., 1996) Industrial wastewater microbes experience tremendous nutritional pressures with heavy competition for a limited supply

of trace nutrients. Competition for trace nutrients is not simply limited to biological demands alone but also include physical and chemical demands as well. Adsorption, hydroxide precipitation, and hydrogen sulfide precipitation all act to withhold essential nutrients and "starve" industrial wastewater microbes creating problems for operators. (Wood & Tchabanoglaus, 1974)

Adding trace nutrient and vitamins to wastewater systems is the low cost alternative to building expensive concrete and steel plant upgrades or lagoon dredging. Supplemental trace nutrient and vitamin addition to wastewater systems activate the enzymes responsible for degrading wastes and allows for maximal growth, reproduction, and metabolism of wastewater microbes.



**Before**

*Photo Taken Before the Application of BIO ENERGIZER®*



**After**

*Photo Taken 4 Months Later After the Addition of BIO ENERGIZER®*

Understanding the impact of microbial nutrition on wastewater treatment facilities has led Probiotic Solutions® to create BIO ENERGIZER®; a nutritional formula with ultra-efficient Micro Carbon Technology™ for microbes that optimizes their metabolic functioning. Under the influence of this stimulant and nutritional formula, wastewater microbes function more efficiently to break down organic wastes, as well as promote species diversity. A wider variety of microbes species working together in a microbial community, allows for increased nutrient cycling creating more efficient and complete wastewater treatment and cuts treatment costs.

Using Micro Carbon Technology™, BIO ENERGIZER® efficiently reduces sludge, odor, BOD/COD, and FOG's. It's a scientific formulation of organic acids, buffers, and nutrients designed to stimulate natural biological ecosystems to increase bio-oxidation of wastewater. Furthermore, BIO ENERGIZER® increases the bio-oxidation of wastewater and efficiently reduces sludge and odor levels in wastewater treatment plants and lagoons, ponds, and reduces grease problems in sewer lines and lift stations.

#### **BIO ENERGIZER® is a very cost-effective sludge removal tool:**

- Less than 1/10th the cost of mechanical dredging
- Less than 1/100th the cost of building a new treatment facility

With treatment costs rising and regulations getting tighter, wastewater operators must consider more cost efficient ways to cut wastewater treatment costs and improve plant performance. Supplemental trace nutrient addition for microbial optimization is an engineering and scientific fact, (and a microbial necessity) proven by extensive research and countless field trials. This is a powerful and a proven strategy to cut wastewater treatment costs. Use BIO ENERGIZER® to improve your plant's performance and cut your land application costs.



**Call Toll Free Today for Your Free Evaluation**  
**1(800) 961-1220**



**MICRO CARBON  
TECHNOLOGY™**



800-961-1220 • info@Probiotic.com • www.Probiotic.com

©2013, Trademarks and registered trademarks of Bio Huma Netics, Inc.