



**White Paper**

# **10 Myths: Using Microbial Products for Wastewater Treatment**



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*A lot has been written on the topic of microbial products, but much of it is based on belief or hearsay rather than direct experience and hard data. This White Paper is based on over 30 years of direct experience in applying microbial products in wastewater treatment, primarily in activated sludge systems with a wide variety of designs and forms.*

### **Myth 1**

#### **All microbial products are the same.**

Nothing could be further from the truth. Experience and tests show that these products run the gamut from complex formulas incorporating a wide range of microbes and other ingredients in liquid, powder, gel and solid forms to simple one species products. The results of numerous comparative tests over a period of decades indicate a wide range of microbial counts and enzyme activities reflected in the results of practical performance tests in the lab and in the field.

### **Myth 2**

#### **The added microbial product will “take over” the resident biomass.**

The term “bioaugmentation” for using a microbial additive to enhance a biological process is an apt one. Added microbes augment the existing biomass making it more stable and increasing its ability to produce an acceptable effluent. There has never been an instance of a microbial additive producing a mono-cultural biomass.

*Added microbes augment the existing biomass, making it more stable and increasing its ability to produce an acceptable effluent.*

### **Myth 3**

#### **Microbial products are genetically-engineered and pose a threat.**

Microbial cultures for bioaugmentation are natural forms selected from nature and then grown in quantity. No “genetic engineering” is involved. Genetically engineered microbes require special permitting and containment, and therefore have never been used in commercial products applied to full-scale systems.

### **Myth 4**

#### **“If they could be there, they would be there.”**

While the “ubiquity principle” may be true in the very long run, it is certainly not supported by the data in the short run. Clearly wastewater systems are dependent on a living biomass functioning under semi-controlled conditions. As the environment changes, the species composition of the biomass changes accordingly. For example, consider the common loss of ammonia oxidizing species under cold weather conditions. These microbes typically comprise only a very small fraction of the biomass in an activated sludge system under ideal temperatures. They are easily washed out when their growth rate slows even a small amount under adverse conditions such as an influent toxic shock or cold weather. Ammonia oxidizing microbes may eventually reseed the plant but the process is exceedingly slow due to the low numbers of such microbes entering the plant from the air and influent waste water.

## **Myth 5**

### **Microbial products are expensive to use.**

In the great majority of cases when an operating problem occurs in an activated sludge plant (e.g. poor settling sludge, no ammonia oxidation, foaming, erratic BOD removal rates), solving the problem by physical means such as adding equipment or chemical products (oxidizing agents, polyelectrolytes, and so on) are much more expensive than bioaugmentation. Case after case has proven this. As with any type of product there are limits on the conditions under which microbial additives can flourish and to the extent to which the desired results can be achieved. And, of course not all potential applications will be economically feasible.

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## **Myth 6**

### **Microbial products will solve all of my problems and produce a discharge within regulatory limits regardless of whether my plant is designed adequately and operated appropriately.**

See Myth 5. Microbial products are not magical solutions (too bad!). These products can sometimes produce dramatic effects, sometimes incremental improvement, and sometimes have little effect if the application is not appropriate. Bioaugmentation only works best when the proper conditions for the growth of the added microorganisms (pH, temperature, nutrient balance, etc.) are present.

## **Myth 7**

### **A small improvement in my discharge water quality is not worth the price of the microbial additive.**

This is definitely not true. Plants operating at an average of 90% removals or better still may not be in regulatory compliance. And many are spending a great deal on chemical products to achieve compliance. Physical system modifications to achieve small percentage increases in removal rates in a secondary treatment plant are generally very expensive, since it takes the effluent water quality into the tertiary treated range.

Consider a plant with an influent fat, oil and grease (FOG) concentration of 30 mg/l and an effluent limit of 5 mg/l (a level generally accepted as allowing water reuse for irrigation purposes). If the plant is discharging 6 mg/l FOG (80% removal), it is in violation of its permit and may be fined. To attain the 5 mg/l limit, the removal must be increased to 83+% (a small improvement but enough to avoid a violation). Thus, a microbial additive that could provide such a modest improvement would merely need to cost less than the potential fine to be justified.

In virtually every such case the cost of achieving the FOG limit by bioaugmenting the indigenous biomass will be dramatically less expensive than the cost of the capital improvements to bring the plant into compliance.

***A microbial additive merely needs to cost less than the potential fine or less than the cost of capital improvements to bring the plant into compliance.***

## **Myth 8**

**You should be able to “see” the results of applying the product in a matter of a few days.**

All natural growth takes time. Microbial products are no exception. It is remarkable that they sometimes achieve results in as little as a week of regular application. But it is a practical fact that the longer the sludge age the inoculated system is operating under, the longer it takes to document the results in a definitive manner. Normally, two to three sludge ages are required. Experience has shown that for most systems a 60 to 90 day data collection period is required to confirm results.

*Microbial products can sometimes achieve results in as little as a week of application. However, documenting results with data in a definitive manner typically requires two to three sludge ages.*

## **Myth 9**

**Microbial products can compensate for severe system design limitations.**

See Myth 6. While bioaugmentation can sometimes compensate for minor inadequacies, it is not a substitute for proper plant design, capacity and operation. Some systems are so overloaded or otherwise limited by design or poor operating conditions that bioaugmentation is not appropriate.

## **Myth 10**

**Microbial products pose a severe health threat.**

Bacterial species chosen for bioaugmentation products are carefully screened to eliminate pathogenic organisms. The substrates upon which the bacteria are grown are non-hazardous. There is no threat in their use as long as proper handling protocols are observed.

Most commercial products contain only biosafety class I microbes (those that are not known to cause disease in humans, animals or plants). Users should take the same precautions in handling bacterial products as they would in handling activated sludge, for example, or soil or any other medium that contains large numbers of microbes. Clearly anyone with a compromised immune system should avoid contact with any of these.

*There is no health threat in using microbial products as long as proper handling protocols are observed.*