

Pulp and Paper Bio-Augmentation



BIO-SYSTEMS
INTERNATIONAL

Specifications

Form: Free-flowing granular powder
Color: Brown or Blue
Nutrient Content: Biological nutrients & stimulants
Plate Count: 5 billion per gram

Packaging

250 grams water soluble packages protected by a foil overwrap.
10 kilos per plastic pail.

Storage

DO NOT FREEZE! Store in a cool dry location. Do not inhale dusts, avoid excessive skin contact. SEE M.S.D.S.

Application Instructions

Treatment Plants

Flow Rate

Initial Dosage

Maintenance**

Up to 1,000 gpd	½ lbs. per day for 3 days	½ lb. per week
Up to 5,000 gpd	½ lbs. per day for 3 days	1lb. per week
Up to 20,000 gpd	5 lbs.*	1½ lb. per week
Up to 50,000 gpd	8 lbs.*	2 lb. per week
Up to 250,000 gpd	15 lbs.*	¼ lb. per day
Up to 500,000 gpd	25 lbs.*	½ lb. per day
Up to 1 mgd	50 lbs.*	1 lb. per day
Up to 5 mgd	50 lbs. per mgd*	1 lb. per mgd per day
Up to 12 mgd	50 lbs. per mgd*	¾ lb. per mgd per day
Up to 100 mgd	30 lbs. per mgd*	½ lb. per mgd per day

* Spread this initial dosage out over the course of 10 days.

** Add as regularly as possible. If it is required to miss one day, add that day's product with the next dosage.

Dosage rate will vary with flow rates, retention times and system variations. The rates above are for a typical, well maintained system.

Activated Sludge Systems

Activated Sludge Systems include various process flow sheets for example: Extended Aeration, Contact Stabilization, Step Aeration, Oxygen Activated Sludge. The application rate for all products is based on the average daily flow rate to the aeration basin, excluding the return sludge stream. For seasonal or widely fluctuating flows, contact your BIO-SYSTEMS technical representative.

Trickling Filter and Rotating Biological Contactors

The application rate for all products is based on the average daily flow rate to the filter or contactor, excluding any recirculating process stream. For seasonal or widely fluctuating flows, contact your BIO-SYSTEMS technical representative.

Lagoon Systems

- For aerated lagoon systems, the application rate based on the average flow to the lagoon.
- For facultive lagoon systems, the application rate is based on the lagoon surface area:

Day 1 through Day 5 20 lbs. per acre per day
Day 6+ 2 lbs. per acre per week

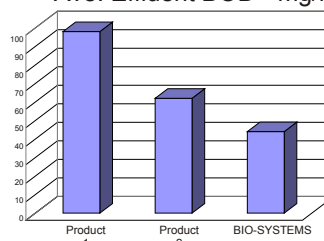
- For anaerobic lagoons, the application rate is based on the total volume of the anaerobic lagoon.

<100,000 gallons 1 lb. - 2x per week per 5,000 gal.

>100,000 gallons ½ lb. - 1x per day per 5,000 gal.

- For lagoons in cold climates, commence program when the water temperature is a least 50°F

Ave. Effluent BOD - mg/l



Case History 1005

This southern Kraft mill evaluated various bioaugmentation products over a three year period. The BIO-SYSTEMS three component formulation out performed other bacteria formulations in effluent, BOD, TSS and upset recovery. Cost of application was less than half of the bug products on their own.



Case History 1022

A midwest recycle mill treated approximately 1 mgd of waste water in an activated sludge system. The use of BIO-SYSTEMS products reduced the filaments in the plant, improved effluent BOD and TSS and speeded recovery from upset conditions.



*Lignin, Celluloses,
Paper Related Chemicals*

Your local Distributor is:

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1-800-232-BUGS
2 8 4 7
www.BIOBUGS.com

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Product Description

BioBug PP contains a specially formulated range of adapted high performance microorganisms and fungi. BioBug PP was developed to increase efficiency and decrease costs in biological treatment of pulp and paper wastes. The range of microorganisms selected for BioBug PP products are chosen for their cellulose degradation abilities under both aerobic and anaerobic conditions. To ensure optimal performance of these organisms under the toughest conditions, they are blended together with "high potency" nutrients and stimulants.

The production of enzymes including a complex of cellulases, hemicellulases, amylases and lipases, provide the capacity to degrade extra cellular polymers (which cause foaming) and suppress the growth of the filamentous organisms by affecting the structure of the filaments.

Effect

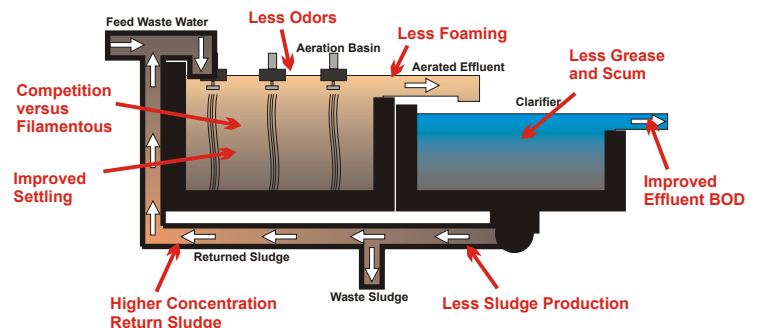
BioBug PP, with its aerobic and facultative anaerobic microorganisms establishes and maintains a biomass which by providing greater resistance to the effects of organic inhibitors present in pulp and paper waste waters, is able to perform more effectively than the naturally occurring biomass. BioBug PP ensures that the natural mechanism for the selection of the biomass population is presented with a range of selected microorganisms. These aerobic and facultative anaerobic bacteria have been taken from their natural environment and then adapted to give optimum performance.

Benefits of BioBug PP:

- Accelerates degradation of unpleasant odors associated with handling pulp and paper wastes.
- Increases the efficiency of over-loaded treatment systems.
- Improves BOD and TSS in effluent.
- Reseeds after plant upset.

Bacterial Formulation **Plus** **Bio-Enhancer** **Plus** **Micronutrient**

- Enhance organic removal efficiency of biological systems, providing lower effluent BOD, COD, and TSS.
- Enhance solids settling where it has been disturbed by loading fluctuations.



- Accelerate the start-up of new systems and aids recovery after upsets.
- Improve cold weather operation.
- Mitigate effects of pulp and paper related loadings and toxic shocks.
- Reduce sludge production.
- Lower operating costs by reducing chemical consumption.
- Competes against filaments.



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