

# BioSpikes® 5000

BioSpikes® 5000 are used in municipal and industrial wastewater lagoons to reduce sludge volume, lower dredging costs and recover lost treatment capacity. BioSpikes® 5000 contain a combination of beneficial microorganisms, fast-acting enzymes, and essential nutrients.

## Benefits

- The combination of microorganisms, enzymes, and essential nutrients stimulates biological activity in the sludge and provides a cost-effective way of reducing sludge volume and improving treatment
- Eliminate or reduce the need for expensive dredging
- The shape and density of the BioSpikes means that they are easily applied over a broad area and to target hot spots where sludge has accumulated.
- Floc particles become larger and denser. Denser floc particles contain less water and lead to greater compaction
- Substances that hold decaying biomass together at the lagoon bottom are degraded
- Complete degradation of decaying biomass and result in a lower and more compact sludge layer

## Performance

BioSpikes® 5000 have proven effective at reducing the sludge volume in wastewater lagoons. Individual results vary according to the sludge makeup and the initial volume.

The use of BioSpikes® in a municipal lagoon resulted in a 38% reduction of sludge volume. The graphs below were developed by mapping a 9 m x 40 m (30 ft x 130 ft) section of the lagoon. Each data point represents a 3 m x 3 m (0.9 ft x 0.9 ft) area. Measurements were taken before and 30 days after application.

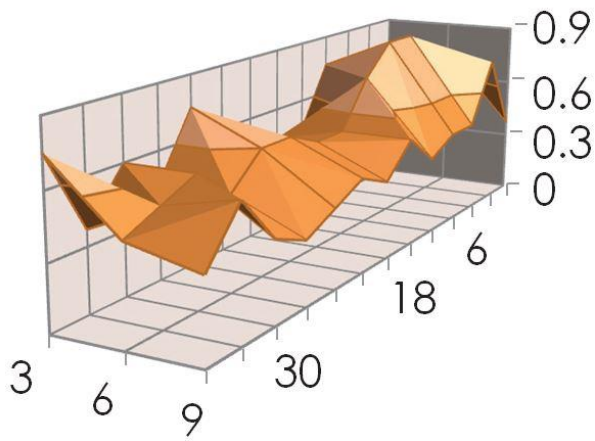


Fig. 1. Pre-trial plots at a municipal lagoon

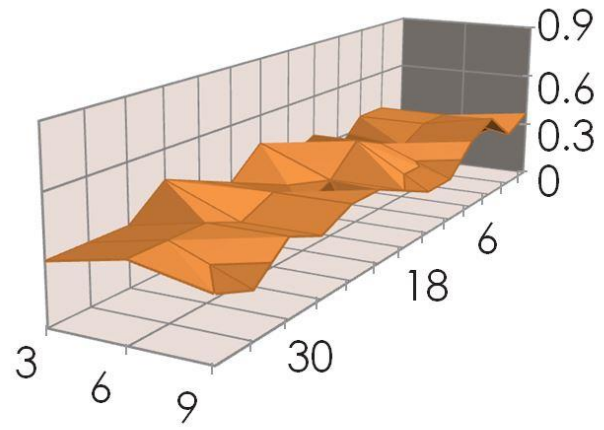


Fig. 2. Post-trial plots at a municipal lagoon

Figures 3 and 4 show difference in floc size and density in sludge samples taken from treated and untreated areas. Floc particles appear larger and denser, which suggests that the sludge compacts more readily. These changes occurred in parallel with a reduction in the sludge layer depth.

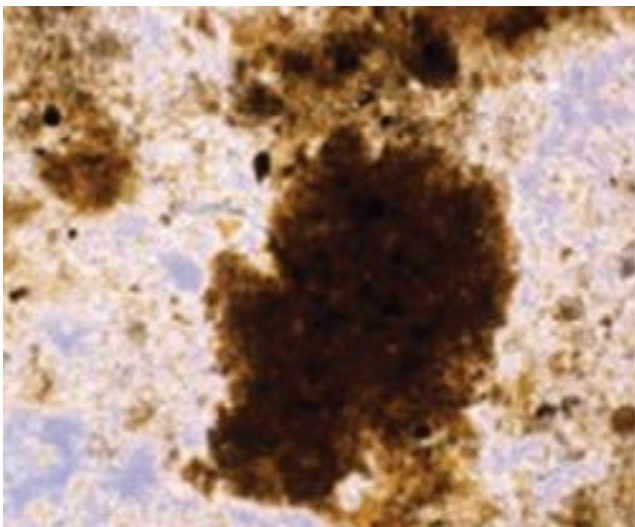


Fig. 3. Large and dense floc particles in treated area

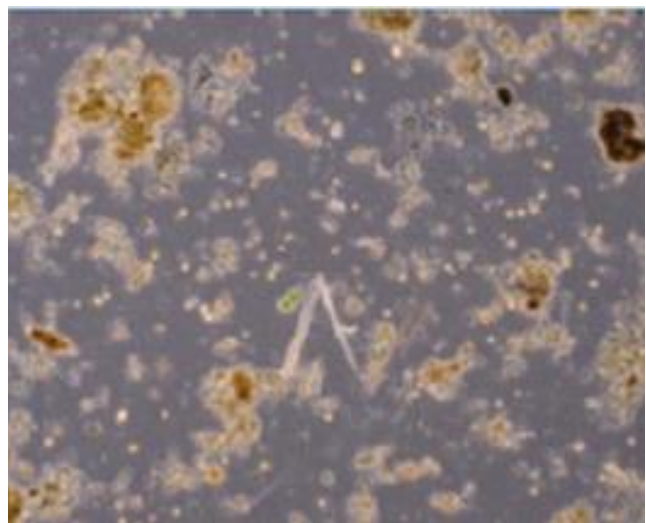


Fig. 4. Floc particles from untreated area

Figure 5 shows the difference in color between treated and untreated sludge samples. Increased biological activity results in a further oxidized and darker sludge.



Fig. 5. Treated settled sludge samples from the bottom of a lagoon (left) appear darker than untreated settled sludge (right). The dark color of the treated settled sludge shows that it is further oxidized, which is an indication of increased biological activity compared to untreated areas.

Figure 6 shows results from three treatment areas in a pulp and paper application. After 60 days, sludge levels in the treated areas dropped 0.56 m (1.8 ft) lower than untreated control areas. This increased treatment capacity by 81% in the treated areas. If these results were extrapolated over the entire 23.4 hectare (58 acre) lagoon, BioSpikes® would provide an additional 34 million gallons of treatment capacity and over 31 hours of hydraulic retention time.

### Sludge reduction

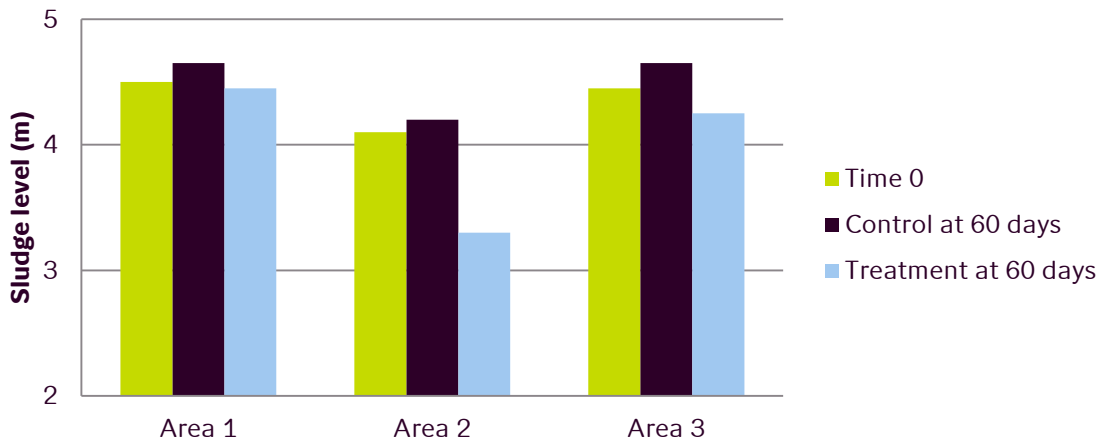


Fig. 6. The application of BioSpikes® 5000 reduces the sludge levels by an average of 0.56 m (1.8 ft)

### Recommended use

BioSpikes® 5000 applied over a broad area reduce the overall sludge layer in a lagoon. BioSpikes® 5000 applied at a higher dosage in problem areas or hot spots yield greater sludge reduction. The dense BioSpikes® 5000 sink to the bottom of the lagoon and are easily applied at the lagoon surface from a boat. PVC piping can be used to position BioSpikes® 5000 in hot spot areas where accuracy is critical. Sludge quality varies with system design, sludge age, amount and type of inert material, and compaction. This affects the degree to which the sludge depth can be impacted, dosing, and dosing frequency.

For applications over broad areas, an initial dosage is recommended to reduce the existing sludge volume. Follow-up applications at reduced dosages are recommended every 30–90 days, depending on the sludge accumulation rate and compactability. Hot spot dosing is recommended for areas where sludge has a tendency to accumulate at an accelerated rate and lagoon efficiency is impacted. Results may vary depending on the concentration of inert solids found in the sludge.

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	<b>Cases per acre</b>	<b>Cases per 1000 m<sup>2</sup></b>
Initial dose	16-24	4-6
Maintenance dose	8-12	2-3
Hot spot dose	16-24	4-6

Applications in lagoons or ASBs treating municipal wastewater and simpler organic materials should dose at the lower end of the dosing range. Applications in heavier industries, like pulp and paper, should use the higher end of the dosing range. Please contact your Technical Service Representative for further assistance in developing a site-specific dosing plan.

## Products characteristics

Each spike is 13.5 cm long and 4 cm in diameter (5.3 in x 1.6 in) and weighs approximately 150 g (5 oz). Each case of BioSpikes® 5000 contains approximately 125 spikes and weighs 18.75 kg (41.34 lb). The breakage of BioSpikes® 5000 during shipping and handling is not uncommon, but breakage does not impact performance provided the equivalent dosing is used.

## Safety, handling and storage

Store in a cool, dry place at 10– 35°C (50–95°F). Avoid inhalation of dust. Wash hands thoroughly with soap and water after handling. Avoid contact with eyes.

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### About Novozymes

Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future. We call it Rethink Tomorrow.

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