

Wastewater Solutions

Novozymes BioRemove™ 5100

## Application Sheet

BioRemove 5100 contains a combination of specially selected microorganisms that are blended to treat a broad spectrum of highly complex wastewaters. BioRemove 5100 is used in industrial wastewaters to improve COD reduction and plant stability.

### Benefits

Industrial wastewater treatment plants have the unique challenge of treating wastes that are generated through manufacturing or production processes. The characteristics of the wastewater generated are as varied as the industries themselves. Even within industries there are site-specific differences that make each plant unique. As regulations for water treatment have grown increasingly stricter and penalties for permit violations have increased, wastewater treatment has never been more important. At the same time, it has become increasingly difficult to meet tighter effluent targets.

Novozymes has built a large microbial library over the years by finding microorganisms and classifying them according to their abilities to perform certain functions. This allows Novozymes to develop formulations of microorganisms that are much more effective than naturally occurring microorganisms in wastewater plants. By adding these organisms, plants can better maintain the health of the microbial community during toxic shocks and enhance the ability of the microbial community to improve the effluent quality.

BioRemove 5100 contains a blend of microorganisms that can degrade a wide variety of organics, which is ideal for industries with complex waste streams. Maintaining a healthy microbial community with BioRemove 5100 improves plant efficiency and simplifies operations by improving BOD and COD degradation, floc formation, and settleability.

## Performance

BioRemove 5100 has been proven to be an effective biological solution for increasing effluent quality and plant stabilization while reducing performance variability in a wide variety of industrial facilities.

A chemical manufacturer experienced regular plant upsets at its 18,200 m<sup>3</sup>/day (4.8 mgd) activated sludge wastewater treatment plant due primarily to a highly variable influent wastewater COD. Historical problems included poor settleability, high polymer usage in the secondary clarifiers, and effluent COD excursions. The average loading to the plant was 31,800 kg COD/day (70,000 lb COD/day) with the plant operating at a sludge retention time (SRT) of 20 days and an MLSS of 3,600 mg/L.

Novozymes evaluated the site and performed a laboratory treatability study using respirometry testing to quantify and predict the impact of BioRemove 5100 on the wastewater prior to conducting a field trial. The results of the testing (Fig. 1) show that a microbial community treated with BioRemove 5100 improved the maximum growth rate ( $\mu_{max}$ ) and increased the COD concentration at which the  $\mu_{max}$  occurred. This information suggests that BioRemove 5100 can help the microbial community remove COD from the system more efficiently and at the same time tolerate higher COD loadings, making the plant less prone to upsets.

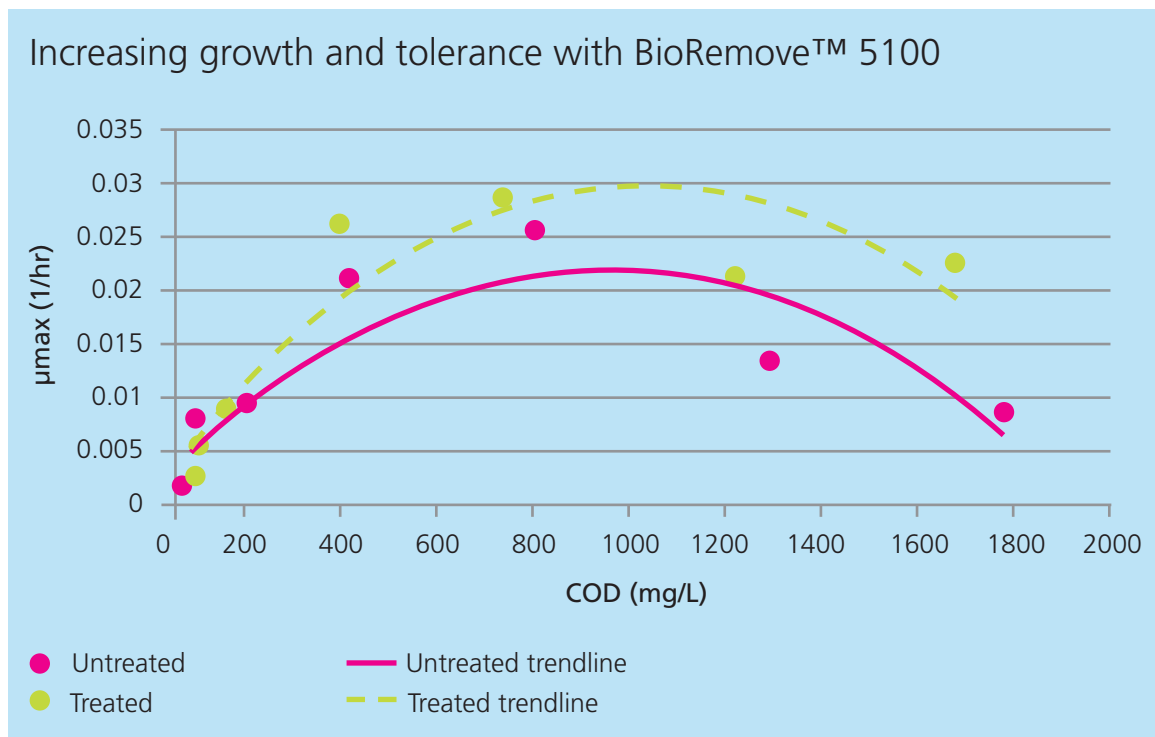


Fig. 1. Treatability study results showing increased growth and tolerance at higher COD concentration.

	$\mu_{max}$ (maximum growth rate)	COD at $\mu_{max}$
Treated with BioRemove™ 5100	0.029	1,020 mg/L
Untreated control	0.023	906 mg/L

Novozymes recommended a BioRemove 5100 program designed to help the plant handle higher COD loading and improve stability of the system. Figure 2 tracks the influent and effluent COD before and after beginning use of BioRemove 5100. During treatment with BioRemove 5100, the effluent stability was greatly increased and effluent COD was consistently low. Influent variability had very little effect on the effluent.

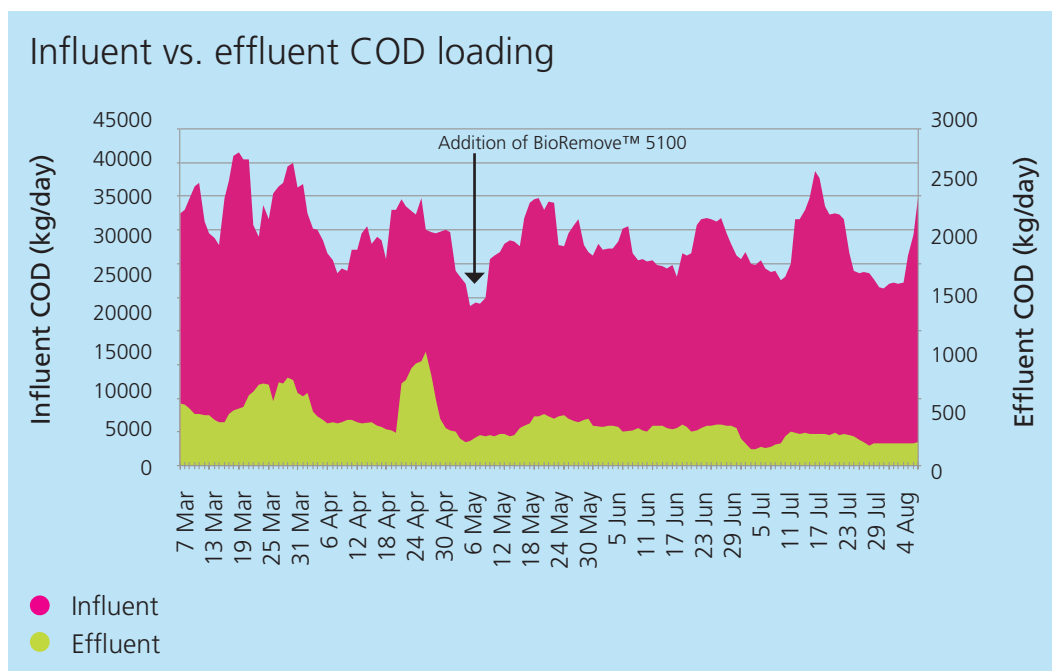


Fig. 2. Field results showing improved stability and COD reduction.

In addition to the effluent COD stability, other improvements in plant operation included a reduction in the sludge volume index (SVI) showing improved settleability and enhanced flocculation resulting in decreased polymer demand.

## Recommended use

BioRemove 5100 can be used for multiple applications including daily dosing to improve COD removal efficiency and maintain plant stability, increased dosage during high loading or upsets, and seeding during plant start-ups.

BioRemove 5100 is added daily directly to the aerobic treatment unit. The microorganisms in BioRemove 5100 perform within a pH range of 6.0–9.0, with an optimum near 7.0. Wastewater temperature affects activity, with an approximate doubling in maximum growth rate for each 10 °C (18 °F) increase in temperature to an approximate upper limit of 40 °C (104 °F). Very low activity can be expected below 5 °C (40 °F).

The dosage rate for BioRemove 5100 is dependent upon the volume of the biological reactor and the COD load. During the initial seeding period, an increased dosage is used to quickly establish the microorganisms in the system. When the microbial community is properly established, regular dosing is necessary to maintain an accelerated level of biological activity.

## Product characteristics

BioRemove 5100 is available as a dry tan powder.

## Safety, handling, and storage

Store in a cool, dry place. Avoid inhalation of dusts. Wash hands thoroughly with soap and water after handling. Avoid contact with eyes.

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