

Wastewater Solutions

Novozymes BioRemove™ 1100

Application Sheet

BioRemove 1100 contains a combination of microorganisms that is specially blended for pulp and paper mill applications. BioRemove 1100 is used to improve plant efficiency and simplify operations by improving COD reduction, decreasing the effects of black liquor spills, and improving system stability.

Benefits

Pulp and paper mills generate a wide variety of pollutants depending on the type of pulp and papermaking process. The pulping process typically generates the largest amount of wastewater pollution compared to other papermaking processes, which can include the production of black liquor in kraft processes.

Although the characteristics of the wastewater depend on the type of process used, generally these pollutants are characterized by high amounts of chemical oxygen demand (COD), biological oxygen demand (BOD), total suspended solids (TSS), and toxic chemicals. Common pollutants found in pulp and paper wastewater include terpenes, alcohols, chlorines/chlorides, acetone, phenolics, sulfides, strong acids, and strong bases. These pollutants negatively affect the ability of microorganisms to form good floc in the aeration, which significantly decreases pollutant removal capacities. As regulations for water treatment have grown increasingly stricter and penalties for permit violations have increased, it has become important to be able to efficiently remove COD, BOD, and toxic substances from the effluent.

BioRemove 1100 contains a blend of microorganisms that can degrade several aromatic compounds and fatty acids, which is ideal for pulp and paper wastewaters with high amounts of pollutants. Maintaining a healthy microbial community with BioRemove 1100 improves plant efficiency and simplifies operations by improving BOD and COD degradation, floc formation, and settleability in clarifiers.

Performance

BioRemove 1100 has been proven to be an effective biological solution for increasing effluent quality and plant stabilization while reducing performance variability in pulp and paper mills. A recycle paper mill with a conventional activated sludge system was exceeding its daily maximum COD and TSS permit 64% of the time and was regularly paying stiff fines for violating monthly averages. Needing a way to quickly improve its effluent quality and reduce the cost of violating its permit, the plant came to Novozymes. An evaluation of the microbial community revealed poor floc formation and signs of toxic stress. Novozymes recommended BioRemove 1100 to enhance the microbial community and improve COD removal efficiency and settling.

After implementing the program, the effluent COD and TSS were reduced by 36% and 47% respectively. The maximum daily COD violations decreased from 72 noncompliance days in the 112 days preceding the program to only 12 noncompliance days in the first 90 days of the program, and the plant was in compliance for monthly COD and TSS limits. COD removal efficiency increased from 72% before the program to 80% during the program. The plant lowered its operating cost by reducing violation-related fines.

Parameter	Time	Average (kg/day)
Influent COD	Before program	5,288
	During program	5,415
	% change	2%
Effluent COD	Before program	1,414
	During program	908
	% change	-36%
Effluent TSS	Before program	284
	During program	150
	% change	-47%

Table 1. Plant performance data showing improvement during the program.

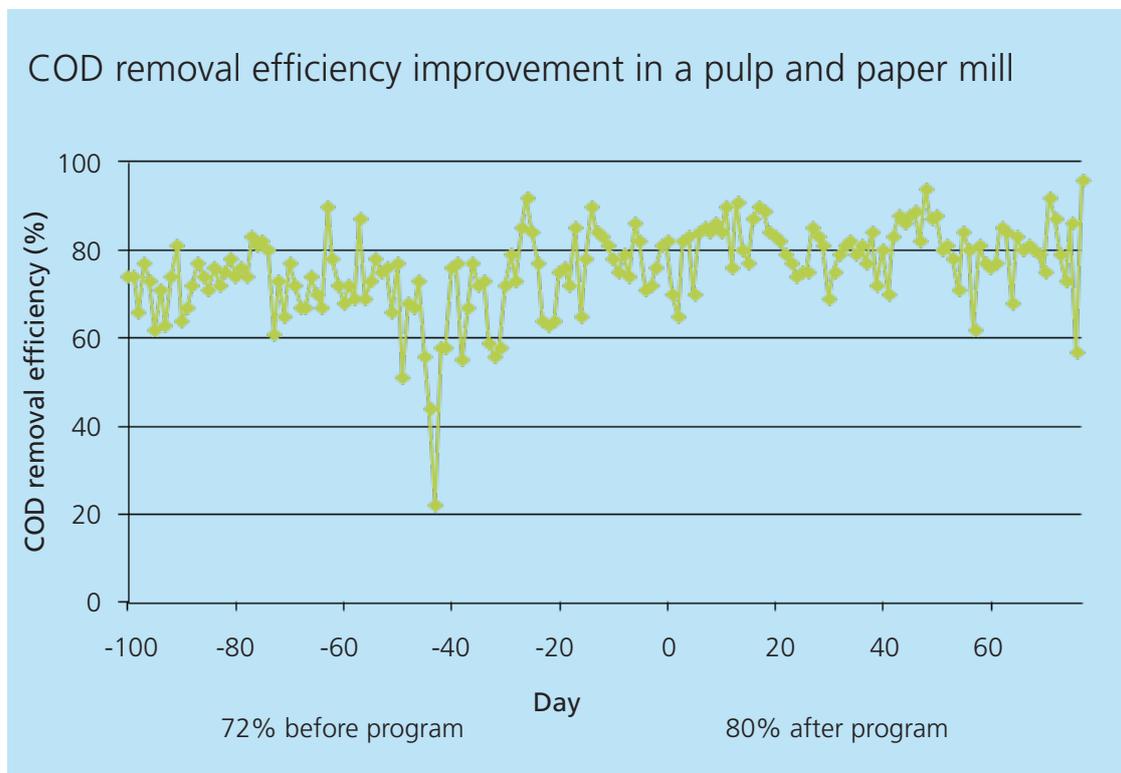


Fig. 1. Improvement in COD removal efficiency as a result of using Novozymes BioRemove™ 1100.

Recommended use

BioRemove 1100 is added daily directly to the aerobic treatment unit. The microorganisms in BioRemove 1100 perform within the pH range 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 (41 °F).

The dosage rate for BioRemove 1100 is dependent on the wastewater constituents, the average daily wastewater flow, 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 developed, regular dosing is necessary to maintain an accelerated level of biological activity. Specific dosing recommendations are determined based on plant-specific conditions.

Increased dosing of BioRemove 1100 is needed for seeding new systems or recovering from black liquor spills.

Product characteristics

BioRemove 1100 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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