# Water & Waste Management

# **BioRemove™ COD**

# Food & Beverage

Case study: Improved COD removal and decreased TSS concentration

novozymes

The application of Novozymes BioRemove<sup>™</sup> COD to a beverage company's wastewater treatment plant lead to improved COD removal and decreased TSS concentration.

# **Benefits**

- Increased COD removal efficiency by 98%
- Decreased TSS concentrations

### Background

The wastewater treatment plant of a famous beverage company that produces non-alcoholic beverages experienced

issues when their wastewater treatment plant became overloaded with poor product batches. The system experienced a shock effect due to an increase in annihilation. Their system is composed of a pumping station, a neutralization tank and four Sequence Batch Reactors (SBRs); however, only two SBRs were in use.

Each of the two SBRs in use are designed to treat 150-300 m3 of wastewater daily. The average influent COD concentration is 5000 mg/L, with peak COD concentrations between 6000-6500 mg/L occurring whenever



Fig. 1. Biological treatment plant diagram. When annihilation amount increased inlet COD concentrations rose up to 6000-6500 mg/L.

annihilation amount is increased. The plant experienced an upset: The COD removal efficiency decreased by 19-25%; the outlet COD concentration, therefore, increased to 3100 mg/L; and, the MLSS concentration was monitored between 1200-1300 mg/L in the SBR tanks.

The plant sought to improve operations and contacted Novozymes for assistance.



# Application

Technical experts visited the site and evaluated the situation. The first recommendation was to assess the current treatment parameters and optimize the ones that lead to problems. Secondly, a bioaugmentation program involving Novozymes BioRemove<sup>™</sup> COD was recommended to be applied to each SBR tank in order to support and obtain a stable biomass and stable discharge values.

The program was accepted and applied on a trial basis. Wastewater samples which were taken from each aeration tank, were analyzed under microscope weekly to control biomass stability before and during application time.



Fig. 2. SBR 1 - Weekly microbiologic analyses



Fig. 3. SBR 2 - Weekly microbiologic analyses

# **Results**

First, MLSS concentration significantly increased in both SBR reactors.



#### **MLSS** concentrations in SBR tanks

Fig. 4. MLSS concentration (mg/L) significantly increased after starting BioRemove COD application in both SBR reactors



After only two weeks, COD removal efficiency was increased to 55% and 3 weeks later it was raised to 78 %.

Between day 21 and 36, COD removal efficiency reached 90% in both SBR tanks.



Inlet and outlet COD concentration were handled in both SBR tanks. Outlet COD concentration decreased significantly after the application if BioRemove<sup>™</sup> COD. Despite stabilization being slower in SBR-1 than in SBR 2, outlet COD concentration decreased to 50 mg/L in both tanks by the end of the trial.









Fig. 7. COD concentration decreased significantly with BioRemove™ COD



Fig. 8. Discharged TSS decreased and COD was removed during the period of the trial



Fig. 9. Discharged TSS decreased and COD was removed during the period of the trial



Before application, discharge TSS concentration was approximately an average of 242.5 mg/L. During the bioaugmentation program, TSS concentration had decreased to an average of 180 mg/L after one month and an average of 42 mg/L at the end of the trial - in both SBR tanks.

# Conclusion

Novozymes' biological program was easy to implement and provided significant benefits over alternative solutions, improving performance and obtaining a stable, stronger biomass. The use of BioRemove<sup>™</sup> COD resulted in:

- Improved plant efficiency
- Lowered costs
- Simplified operations







#### **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 to 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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