

An aerial photograph showing a city skyline in the background, a large body of water in the middle ground, and a wastewater treatment plant in the foreground. The plant features several circular clarifiers and rectangular aeration tanks. The sky is blue with scattered white clouds. A green rectangular shape is visible in the top-left corner of the image.

Water & Waste Management

BioRemove™ COD SF

General Industry

Case study: Georgia Gulf Delaware City
applied bioaugmentation to meet effluent
compliance

Rethink Tomorrow

novozymes®



A LIMIT DIFFICULT TO COMPLY WITH : < 0.5 mg MBAS/l

The Georgia Gulf Delaware City wastewater plant in Delaware manufactures PVC emulsion polymers that generate about 950 m³ of process wastewater per day. The plant has a NPDES permitted direct discharge wastewater facility. Plant personnel contacted Novozymes to assist the plant in meeting effluent limits for surfactants as measured by Methylene Blue Active Substances (MBAS). The plant uses 3 proprietary surfactants in their manufacturing operations and identified one surfactant as being responsible for high MBAS levels. Process modifications or raw materials substitution was not an alternative in helping them meet their permit limit of 0.5 mg/l.

Operational problems related to seasonably low ambient temperatures and low mixed liquor suspended solids in the activated sludge basin also appeared to exacerbate the problem. The plant was operating in a continual Catch-22 situation since high surfactant dosages would result in a biological upset, heavy foaming and subsequent biomass loss. Normal influent MBAS concentrations range from 5-15 mg/l with spikes being occasionally received in excess of 30 mg/l (detection limit at Georgia Gulf plant). The plant treats 950 m³ with phosphate added at the influent side for nutrient control (TKN is already adequate).

Primary clarification is followed by secondary treatment in an integral circular aeration basin/clarifier with an aerobic digestion cell. MLSS in the activated sludge basin is maintained at 1000-1500 mg/l.

A longtime Georgia Gulf employee and senior lab analyst recalls the periodic upsets, high effluent surfactants, and resulting operational problems (including a very cold Christmas Eve dealing with a plant upset due to high surfactant loadings). In the past a competitor of Novozymes recommended bacterial augmentation. A direct addition program ensued with little success. This program involved pre-hydrating dry culture in a bucket with addition directly to the system. Consistency of feed was difficult to maintain due to manpower limitations and performance was marginal and unreliable.

Novozymes' proposal

When contacted, Novozymes initially suggested a treatability study to determine the potential efficacy of bioaugmentation on effluent MBAS levels. This study determined that under identical conditions removals of 84% and 14% were achieved for the augmented and non-augmented trials, respectively. Based on a successful bench scale demonstration, bioaugmentation using both BioRemove™ COD SF and BioRemove™ COD LT was recommended. In order to achieve consistent dosing of bio-cultures to the system and provide

for higher cell counts with less product usage, a Pre-Acclimation Device (PAD) was proposed. The maintenance dosage schedule recommended was 1.5 kg/day of a BioRemove™ blend (BioRemove™ COD SF and BioRemove™ COD LT).

RESULTS

The addition of the PAD and basin temperature control using steam feed introduced to the influent side of the aeration basin during the winter months, have been instrumental in allowing the plant to consistently maintain

effluent MBAS levels of < 0.1 mg/l. Plant personnel are now concerned that their low effluent levels could trigger a ratcheting down of the current effluent limits during the next permit renewal. Figure 1 is showing that before bioaugmentation MBAS removal rates had never been higher than 50%, whereas they have been maintained above 95% since the trial began. Full scale treatment has resulted in even better performances than the lab scale study.

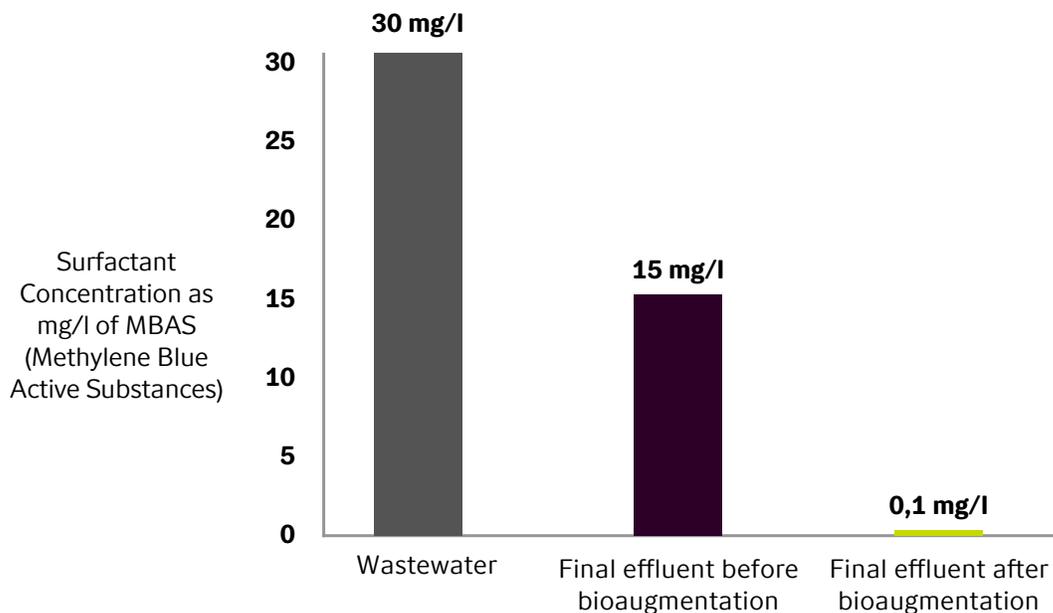


Figure 1



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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