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Mechanical Plant Start-Up After Failed Activated Sludge Seeding

Choosing an appropriate seeding method for wastewater operations can have a significant impact on biological treatment efficiency. Activated sludge is traditionally used to seed new treatment systems and supplement others that require bioaugmentation. A common issue in activated sludge systems is sludge bulking (SB), or the uncontrolled growth of filamentous bacteria (FB).¹ The impacts of sludge bulking include, but are not limited to, poor settleability, impaired biological nutrient removal, and increased facility maintenance.

Predicting whether SB will occur in a newly seeded wastewater process is difficult because the FB in activated sludge respond differently to varying system conditions. One method for preventing bulking is to quantify the proportion of FB in activated sludge before inoculation. Previous studies have found that SB can occur in systems with a volume fraction of FB as low as 1-20%.^{2, 3}

Even when filament-forming organisms are present in low abundance, they can still cause treatment issues. Bioaugmentation with a specifically designed microbial community can be a more reliable alternative to using activated sludge as seed material. The following case study outlines the use of ProBiotic Scrubber® II (PBII) in a 0.7 MGD mechanical wastewater treatment plant (MWTP) to restore a healthy biomass after the plant was seeded with FB.

The wastewater from a small resort town in Colorado was processed at a mechanical plant with rotating bed contactors for nutrient removal. The plant operated properly until a concentrated load of petroleum-based toxic waste was introduced into the system. The biological treatment was inhibited so severely by this event that the MWTP had to be reseeded. To restore the plant biomass, the operators brought in activated sludge from a neighboring wastewater treatment facility and added several loads to the plant.

What the operators did not know was that they had seeded their system with FB that would cause problems later.

Shortly after inoculation, the plant began having trouble with foaming, solids settling, and continuously clogged filters. Facility personnel were scheduled around the clock just to keep up with backwashing the filters. After examining a mixed liquor sample from the plant, the head operator realized that FB had accumulated in the reactor and were preventing effective solids and nutrient removal. The abundance of these organisms needed to be reduced to resume proper wastewater processing. Facility management contacted BioLynceus® to provide a bioaugmentation plan to reestablish a healthy biological community in the treatment system.



Figure 1. MWTP aeration basin after PBII treatment, showing normal foam development.

BioLynceus® PBII was supplied to the aeration tank of the 0.7 MGD system. Within 24 hours of applying PBII, nitrification was restored in the basin. Suspended solids in the plant effluent were gradually reduced over several weeks. This indicated that the biology in the facility was shifting to a more desirable composition that allowed settling to occur. Foaming in the aeration basin was also reduced to normal levels (Figure 1). The operators were relieved to see such an improvement in biological treatment because they had to meet stringent NPDES permit limits to discharge into the Blue River.

After treating the MWTP with PBII, the system developed a better-settling, more capable biomass for processing influent wastewater. The facility now keeps PBII on hand to restart the plant instead of hauling activated sludge.

1 Jenkins, D., Richard, M.G., Daigger, G.T., 2003. Manual on the Causes and Control of Activated Sludge Bulking, Foaming, and Other Solids Separation Problems. Lewis Publishers, Boca Raton, FL.

2 Krhutkova O, Ruzickova I, Wanner J. Microbial evaluation of activated sludge and filamentous population at eight Czech nutrient removal activated sludge plants during year 2000. Water Sci Technol 2002;46(1/2):471-8.

3 Palm JC, Jenkins D, Parker DS. Relationship between organic loading, dissolved oxygen concentration and sludge settleability in the completely mixed activated sludge process. J Water Pollut Control Fed 1980;52:2484-506.

BioLynceus® ProBiotic Scrubber® II is an effective seed for restarting MWTPs.

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