

Startup of a Fixed-Film Activated Sludge Process

Establishing a functional biological community is essential when starting a new wastewater treatment plant. Monitoring biological growth during startup provides plant staff with the insight needed to adjust operations and achieve efficient treatment. Settleometer testing of aeration basin effluent in activated sludge processes can indicate whether the biomass will settle properly or cause bulking. By evaluating settleometer readings and mixed liquor suspended solids (MLSS) concentrations, operators can calculate sludge volume index (SVI) values that describe biomass settleability. SVI values vary among activated sludge systems, but Jenkins et al. (2003) found that sludge bulking occurs at SVI values greater than 150 mL/g.¹ The following case study outlines the startup of a 1 MGD integrated fixed-film activated sludge (IFAS) process using ProBiotic Scrubber® II (PBII) as a seed.

A wastewater treatment facility in Colorado serving 6,600 people needed to upgrade its existing infrastructure. The original mechanical plant was built in 1956 and was last upgraded in 1985. After 25 years, the plant had deteriorated to the point that effluent ammonia levels exceeded permit limits. This was a concern because the effluent was discharged to the Arkansas River, an essential water resource for downstream farmers and municipalities. To bring the plant discharge back into compliance, facility management decided to add a new treatment train to the existing system. The facility added an IFAS process with a higher treatment capacity than the old trickling-filter plant.

After construction was completed, the system needed to be seeded with the proper biology for efficient wastewater treatment. The operators were hesitant to seed the new IFAS process with activated sludge from the old plant because they did not want to transfer the same treatment issues to the new system.

Due to logistical concerns and cost, the project engineer chose BioLynceus® PBII to start up the plant. The IFAS process was inoculated with PBII in the aeration basin under low-flow conditions. After 10 days, the biomass had aggregated and was ready to process the full influent load.

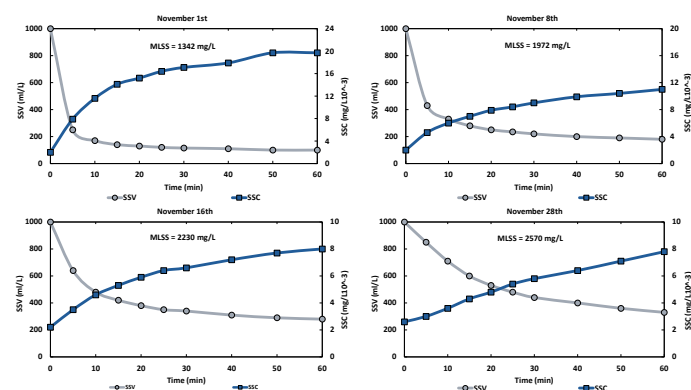


Figure 1. Settled sludge volume (SSV, gray) and settled sludge concentration (SSC, blue) were determined from aeration basin effluent samples collected throughout the first month of IFAS operation. SSVs were recorded over 60 minutes using a settleometer test. MLSS concentrations were measured on settleometer testing days. SSC values were calculated using the SSV and MLSS values.

Settleometer testing was conducted throughout the first month of IFAS system operation. The results showed that SSV decreased over time while SSC increased. These trends indicated proper settling in the aeration basin effluent. Additionally, SVI values were calculated using the 30-minute SSV for each settleometer test. The average SVI during the first month of operation was 130 mL/g, which was below the threshold for poor-settling biomass.

After one month of PBII treatment, operations reports showed that the clarifiers were fully functioning and the discharge was within NPDES limits. PBII provided the facility with an optimal biomass for wastewater processing. The system performed so efficiently that the plant was selected as Wastewater System of the Year in 2013 by the Colorado Rural Water Association.

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.