

INCREASING SETTLING OF SUSPENDED SOLIDS WITH BAE

The Cinnaminson Sewerage Authority Wastewater Treatment Plant (CSA WWTP), built in 1957, was designed as a plug flow activated sludge plant with plant effluent discharging into the Delaware River.

Design capacity is 2 MGD, with daily flow averaging 1.1 MGD. The plant contains six primary clarifiers, two aeration tanks with surface aeration, six secondary clarifiers with a recirculation line installed feeding a portion of secondary clarifier effluent to a splitter box prior to the primary clarifiers. Secondary clarifier effluent is disinfected through chlorine contact tanks and discharged to the Delaware River.

BAE ANALYSIS

The New Jersey Institute of Technology conducted an analysis of BAE to determine organics, in-organics, nitrogen, & phosphorus. A GC/MS spectrometer scanned samples for selected organics by the U.S. EPA's standards for the evaluation of solid waste.

Results conclude that BAE contains 88.7% volatile organic carbon, with a Phosphorus, TKN value of 63.22 mg/l, and 58.3 mg/l, respectively. These results further demonstrated that a small amount of 75 targeted compounds were found, indicating BAE does not pose a threat to biological degradation.

OVERVIEW

Prior to this study, BAE had been added to the effluent of the primary clarifier where it mixes with the return activated sludge (RAS) just before entering the aeration tank on a regular basis. BAE was dispensed at the rate of a one-half gallon every 12 hours.



TESTING PROTOCOL

The protocol for this evaluation was written and administered by Emil C. Herkert, PE, DEE, to measure the effect BAE was having with the activated sludge at the CSA WWTP. The study took place over eight months.

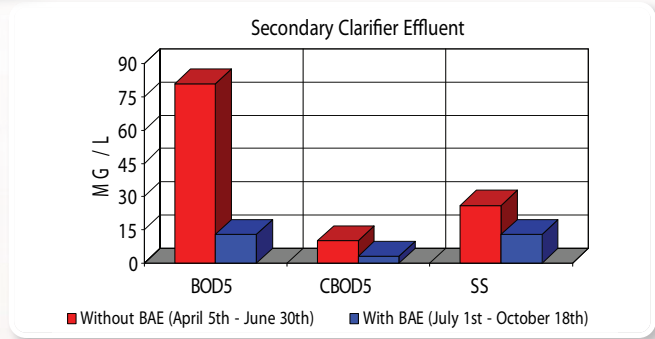
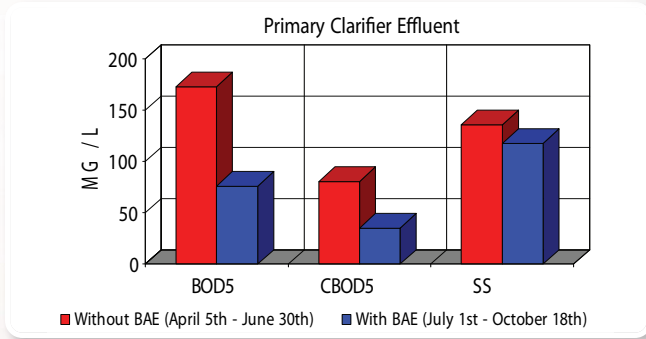
Composite sampling was done at the Primary and Secondary Clarifier Effluent and analyzed by a state certified laboratory for BOD₅, CBOD TKN, Ammonia, Nitrite, Nitrate, MLSS, MLVSS, and pH. In addition, grab samples were taken from the RAS and aeration tank once a week and tested at the CSA laboratory for MLSS, MLVSS, and SVI.

Beginning April 5th, the daily addition of BAE was suspended through June 30th

On July 1st, BAE was added at the rate of a 1/2-gallon every 12 hours through October 18th.



THE SOURCE



RESULTS

On April 5th, the addition of BAE was discontinued through June 30th, with the following averages for this period: BOD5 173 mg/l, CBOD5 81 mg/l, SS 136 mg/l.

On July 1st, BAE was added to the system and results show through October 18th, the primary clarifier effluent BOD5 averaged 76 mg/l, CBOD5 averaged 35 mg/l, and SS had averaged 118 mg/l.

The reduction in BOD5 and CBOD5 of 56% can only be attributed to the addition of BAE.

Secondary clarifier effluent, without the addition of BAE to the aeration tanks, was found to contain the following averages for the first period of the study: BOD5 81 mg/l, BOD5 10 mg/l, and SS 26 mg/l.

Secondary clarifier effluent with the addition of BAE to the aeration tanks in the study's second phase contained the following averages: BOD5 13 mg/l, CBOD5 3 mg/l, and SS 13 mg/l.

Reductions of BOD5, CBOD5 and suspended solids (SS) achieved after the addition of BAE had the following averages

- BOD5—83% reduction
- CBOD5—70% reduction
- SS—50% reduction

These results indicate that BAE significantly impacted the secondary effluent. exposure to caustic chemicals that operators face daily.

CONCLUSION

BAE had a significant impact on BOD5, CBOD5, and SS removal in the secondary clarifier as indicated by the charts above.

The effluent SS was measured at an average of 26 mg/l during the suspension of BAE from April 5th to June 30th. When BAE was added to the system once again, it decreased the effluent SS by 50% to an average of 13 mg/l.

This 50% reduction of effluent SS means that every day an additional 125 pounds of SS has been kept from entering the Delaware River. Secondary clarifier observation during BAE use indicated a clear and sparkling effluent.

YEARLY OPERATIONAL SAVINGS

Caustic Soda	\$7,200
Secondary Clarifier Polymer	\$21,316
Removal of Second Aeration Tank from Operation	\$31,677
Reduction in Sludge Disposal	\$42,000
Total Yearly Savings	\$102,193

