



Cumberland County Utilities Authority

Bridgeton, New Jersey

The Cumberland County Utilities Authority (CCUA) Wastewater Treatment Plant (WWTP) has served as a sewage treatment center since the late 1800's. In May of 1979 the CCUA opened a 7 MGD WWTP and today is the largest user of the Cohansey River Basin.

The plant is a secondary treatment design with, flow equalization, primary & secondary clarifiers, two 1.5 MGD aeration tanks, and sodium hypochlorite disinfection. Solids are processed by anaerobic digestion involving one primary digester and one two stage secondary digester.



The final disposal of sludge from the plant is by incineration used only at certain times of the year and by land application. Sludge residuals applied to land are tested to strict standards set forth by the NJDEP and EPA. The CCUA applies biosolids with a specially designed for subsurface injection. Farms who use CCUA biosolids do so for their effective soil conditioning benefit in growing sod, nursery stock, and grains. Biosolids can only be applied through the strict guidelines under the direction of the New Jersey Department of Agriculture's Agricultural Management practices.



The CCUA began using BAE in their primary anaerobic digester because they were having difficulty maintaining the minimum volatile solids destruction (VSD) of 38% required by the NJDEP for land applying sludge.

These problems also affected the methane production within the digester, causing the plant to rely on their local natural gas supplier to provide energy for operating the boilers to heat the digester as well as the boilers responsible for heating the administration building.

Methane production from anaerobic digestion requires proper pH and reliable organic matter to promote maximum methane production. When these two issues were examined, it appeared that both were in good working order.

The boilers were checked and temperature of the biomass in the digester was monitored. This was done because methane producing bacteria are extremely sensitive to temperature change, and a swing of 20°F can cause a 50% loss in methane production and as little as a 5°F swing can inhibit methane formers enough to cause acid accumulation, foul odor, and possible digester failure.



After completing several evaluations of the primary digester it became evident there was a breakdown in the anaerobic digestion process.

It appeared from the operation that the first phase of digestion was taking place and biomass was being broken down.

It was the second phase that was having difficulty responding to the process, and in this phase the acid forming bacteria seemed to dominate the methane-forming bacteria, causing a break down in methane production and creating a foul odor.

BAE was added to the digester at the rate of three gallons per day. Within 90 days, methane production increased, creating more gas than demanded, and the digester recorded VSD levels as high as 62%.

BAE clearly demonstrated that a balance between the acid formers and methane formers had been created, and stimulation had taken place within the primary digester while improving the overall performance of the two-stage secondary digester.

Dewatering by the plants centrifuge machine improved, receiving digested sludge as high as 6% creating a dewatered cake at 25 to 28%.

The CCUA made a decision to change their dewatering process from centrifuge to gravity belt thickening.

This process required polymers to be added at the influent of the gravity belt and some of this material worked its way into the primary digester.

Polymers used in this operation were toxic to the methane formers, causing a loss of gas and the odors associated with them. BAE treatment was increased to compensate for the problem and within 120 days the problem was eliminated.

Because of the success experienced in the primary digester, it was decided to treat the aeration tanks with BAE.

The organic loading averaged 675 mg/l BOD and for several years it experienced high levels of TSS and BOD effluent. Many remedies had been tried to eliminate the problem; however, none were successful.

BAE was added to each 1.5 MG aeration tank at the rate of 1.5 gallons. Within 30 days the TSS BOD levels began to drop and below 10 mg/l daily. As a result from the addition of BAE, the CCUA has taken one of it's 1.5 MG aeration tanks out service.

As we have seen many times before the use of BAE increases biomass activity in the aeration tank, and mixed liquor levels are lowered.

Stimulation of microbial growth from BAE in anaerobic and aerobic environments has been demonstrated in this study, and these benefits have greatly contributed to cleaner effluent and the cleaning up of our waterways.

