

TCEQ has tasked us with formulating an experiment to determine an optimal dosing period for an Aerobic Treatment Unit (or ATU). With a limited budget and timeframe (as this is a thesis project for one of our graduate workers), we decided to format the project by testing three different dosing period over two initial wastewater strengths.



TCEQ wanted the tests to go over initial wastewater strengths of 200-400 mg/L BOD<sub>5</sub>, as well as 1100-1400 BOD<sub>5</sub>. The three different dosing periods selected were three doses per day (once every eight hours), twelve doses per day (once every two hours), and twenty four doses per day (once every hour).

Current Phase: We are adjusting the flowrate of each of the ATUs from 100 gal/day to 350 gal/day in order to conduct the experiment over a large enough data range (below is a picture conducting our balance adjustments). As we work to achieve steady flow, we are building an automated pumping system and corresponding pipe line to introduce high strength wastewater (sludge provided by Texas A&M University's WWTP) into the ATU's initial holding tank. With the correct balances, we will maintain steady BOD readings throughout the first reading period of the experiment. Even though our range is 200-400 mg/L BOD<sub>5</sub>, we are aiming to maintain 300 mg/L BOD<sub>5</sub>.



Next Phase: After collecting all necessary data for the influent vs. effluent graph (BOD5, CBOD5, TSS, pH) over the 200-400 mg/L BOD5 range, we will adjust our influent to maintain a concentration ranging from 1100-1400 mg/L. Given our tank volume, introduced sludge strength, and the current BOD5 of the ATU's influent, introduction of milk and sugar (along with sludge) is required. The combination of milk and sugar drastically increases BOD5 with minimal volume use. Once regulation of 1100-1400 mg/L BOD5 is held consistently, testing for the second initial parameters will begin.

From these two portions of the experiment, we are able to draw the following conclusions from each of the initial wastewater strength parameters given by TCEQ:

- 0-3 doses per day works most effectively
- 3-12 doses per day works most effectively
- 12-24 doses per day works most effectively
- 24+ doses per day works most effectively

The experiment's main goal is to discover which dosing period works best concerning ATUs under different conditions, which could be residences, small commercial sites, or any application that would benefit from the contribution of an aerobic treatment unit. From this experiment, we can determine whether the strength of wastewater affects the optimal dosing period for the ATU, as well.