

Case Study: BOD Removal through Bioaugmentation

Situation:

An Alabama Paper mill is looking for ways to reduce costs during the recent economic downturn that the United States and the world economies face. All waste is treated by means of a 46.4 acre Aerated Stabilization Basin (ASB) with a network of diffused aerators and several blowers. A clarifier bypass pond of one acre with three mechanical aerators serves as the inlet and pre treatment of the wastewater prior to entering the actual ASB.

Historically the mill has operated within the permitted limit and often reports single digit BODs at the discharge of the polishing pond. The trial was instigated by a large increase in nutrient pricing brought on by global raw material shortages during the summer and fall of 2008. This trial evolved into the current program.

Program:

The previous program called for a constant feed of MacroGro™ 1607 nutrient at a rate of 200 gallons per day. The current program, beginning April 1, 2009, called for a constant feed of MacroGro 1607 nutrient at 100 gallons per day coupled with a supplemental feed of 20 pounds per day of BioStar™ P bioaugmentation cultures. The BioStar P bacteria were incubated in an EBS Bacterial Acceleration Chamber (BAC-300) set to overflow and discharge every six hours.

Results:

The program began on April 1, 2009. Since the beginning of the program, the pounds of BOD reduced per day has increased each of the three months of 2009 versus those same months in 2008. An average reduction of 89% was recorded for April and 92% and 90% for May and June 2009 respectively (See Table 1 and Figure 1). When the data is compared with the same three months in 2008 there was an increased percent reduction of 2.8, 2.4, and 5.3 of pounds of BOD per day (see Figure 1). Due to the high cost of nutrient during 2008, the total savings appear inflated as prices decreased significantly in 2009. In order to take the inflated cost out of the equation, the study was done using an average cost of nutrient for the year of 2009. For the year 2008, at the 2009 nutrient

cost, the cost per day was \$397. The total nutrient cost of the year was \$144,905. By reducing the feed rate 50% in 2009, the nutrient cost was \$198 per day and \$72,270 for the year. The cost of the supplemental bacteria feed was \$180 per day bringing the total cost per day in 2009 to \$378. The total savings per day is \$19 resulting in a savings of \$6,935 per year.

Conclusion:

Even though this study does not show a large financial savings with 2009 pricing, the increase in pounds of BOD removed versus the yearly cost of removal shows the effectiveness of this program.

Table 1 – Summary of Results

| | Lbs BOD Removed per Day | | % BOD Removed per Day | | Cost per Day | | Cost per lb BOD Removed | |
|----------------|-------------------------|--------|-----------------------|-------|---------------|-------|-------------------------|---------|
| | 2008 | 2009 | 2008 | 2009 | 2008 | 2009 | 2008 | 2009 |
| April | 15,567 | 24,273 | 85.9% | 88.7% | \$402 | \$381 | \$0.026 | \$0.016 |
| May | 22,418 | 27,405 | 89.3% | 91.7% | \$402 | \$381 | \$0.018 | \$0.014 |
| June | 20,943 | 22,269 | 85% | 90.3% | \$386 | \$373 | \$0.018 | \$0.017 |
| Average | 19,643 | 24,649 | 86.7% | 90.2% | \$397 | \$378 | \$0.021 | \$0.016 |
| | 25.5% increase | | 4% increase | | 4.8% decrease | | 24% decrease | |

Figure 1 – Average Percent BOD Reduction per Day

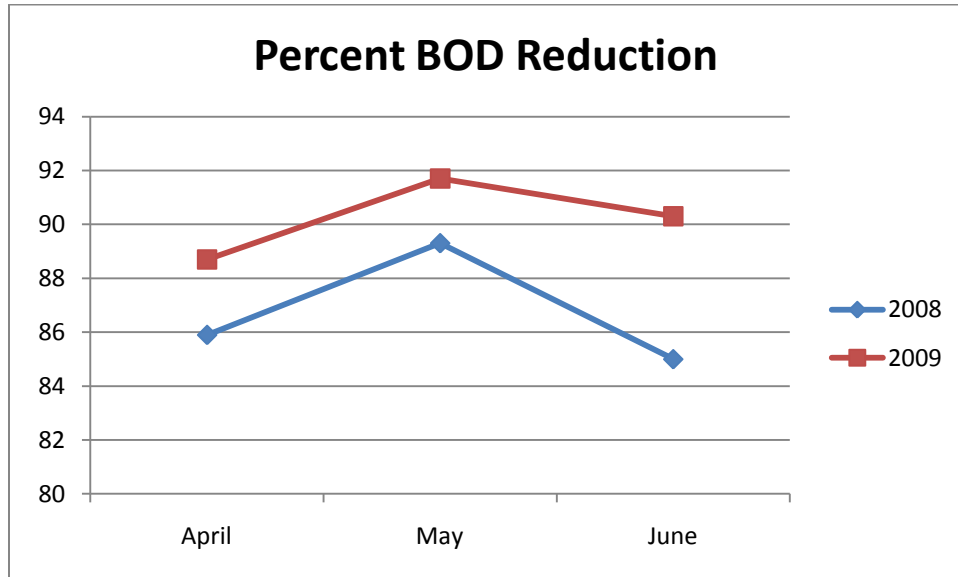
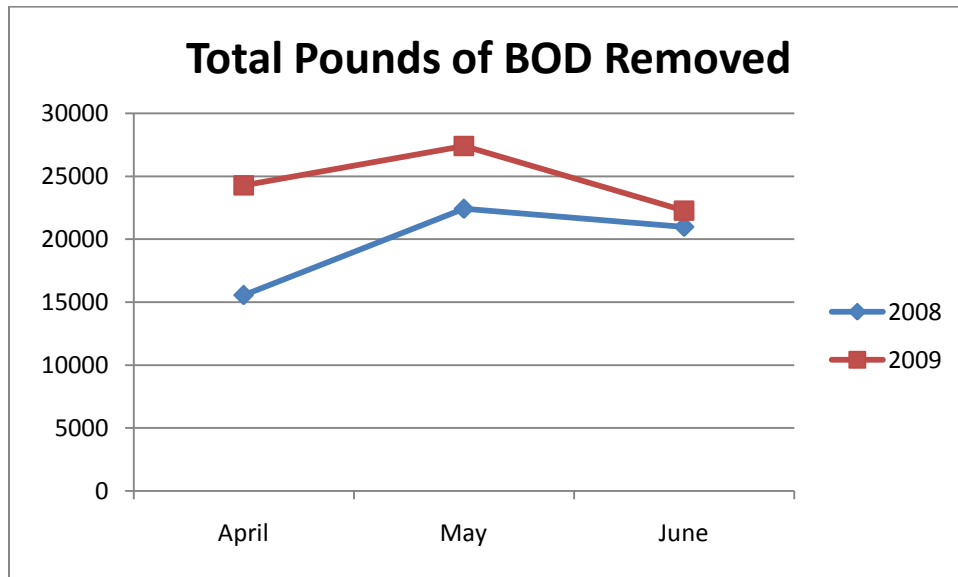


Figure 2 – Average Total Pounds of BOD Removed per Day





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