

# CASE STUDY:

## BOD REMOVAL THROUGH BIOAUGMENTATION

### REQUEST:

Facing the ramifications of the economic downturn in 2008-2009, an Alabama Paper mill was looking for ways to reduce operating costs. The mill treated their wastewater via a 46.4-acre Aerated Stabilization Basin (ASB) with a network of diffused aerators and several blowers. A one-acre clarifier bypass pond with three mechanical aerators serves as the inlet and pre-treatment of the wastewater prior to entering the actual ASB.

Historically, the mill operated within their permitted limit and often reported 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. It was felt that the bacterial quantities needed for BOD reduction, which were normally obtained through cell division utilizing nutrient, could instead be obtained through the implementation of a bioaugmentation program. This would allow for a reduction in nutrient feed rates while increasing bacterial feed rates. The goal was to balance the two products in a way that saved money while maintaining or improving BOD reduction.



### RECOMMENDATION:

The constant feed rate of MacroGro™ 1607 nutrient was reduced from 200 gallons per day to 100 gallons per day on April 1, 2009 and supplemented with 20 pounds of BioStar™ P bioaugmentation cultures daily. The BioStar P bacteria were incubated in an EBS Bacterial Acceleration Chamber (BAC unit) set to overflow and discharge every six hours.

### RESULTS:

The trial began on April 1, 2009. Since the beginning of the program, the pounds of BOD reduced per day increased each of the first three program months of 2009 versus those same months in 2008. As can be seen in Figure 1 and Table 1, the percent BOD removal improved by 2.5 - 5.0% for the three program months of 2009 versus the same months in 2008.

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 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. However, with the 25.5% increase in pounds of BOD removed each day, the actual cost per pound of BOD removed was reduced by 24%. This shows that significant performance improvement was achieved while also reducing overall cost of wastewater operations.

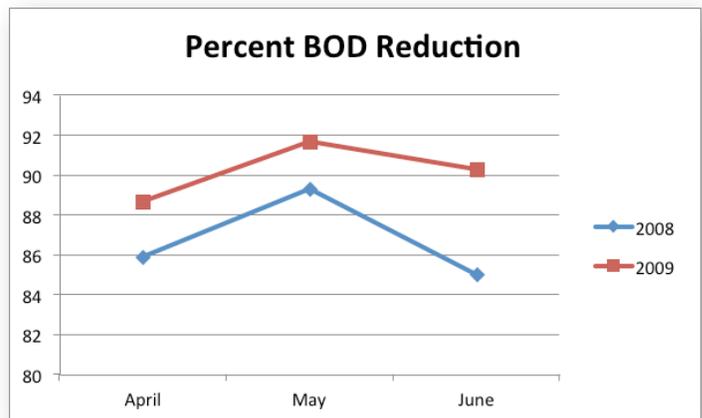


Figure 1 – Average Percent BOD Reduction per Day



	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
<b>April</b>	15,567	24,273	85.9%	88.7%	\$402	\$381	\$0.026	\$0.016
<b>May</b>	22,418	27,405	89.3%	91.7%	\$402	\$381	\$0.018	\$0.014
<b>June</b>	20,943	22,269	85%	90.3%	\$386	\$373	\$0.018	\$0.017
<b>Average</b>	19,643	24,649	86.7%	90.2%	\$397	\$378	\$0.021	\$0.016
	25.5% increase		4% increase		4.8% decrease		24% decrease	

Table 1 – Summary of Results



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