

THE INJECTION OF BYO-GON TO BIOREACTORS



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ABSTRACT

We started a trial of a natural chemical called Byo-Gon that could help LOGAN CITY COUNCIL with the problems with high Ammonia in the inflow from the by-product of company waste. In turn we have seen a reduction in total N and some Scum reduction. Byo-Gon was proposed as a means of improving the growth of the micro-organisms. Which we have seen some signs first hand under the microscope. The improvements in the growth of numbers of micro-organisms eg: Stalk Ciliate, Rotifers and less filamentous. Some improvement with the anaerobic bacteria, Dosing at a higher rate we did see improvements on scum removal on one of the Bioreactors. This was dosing at 42L of Byo-Gon to 700L of recycled water. Now we dose concentrated Byo-Gon.

1.0 Introduction

1.1 What is BYO-GON ?

Byo-Gon was patented by the Research Corporation of the University of Hawaii upon the discovery of a new alkaloid, Xeronine. This alkaloid is a cell growth accelerator that acts as a precursor to enzymatic activity at the cellular level. Enzymes govern the rates and types of biologic reactions that take place, if cells require specific environmental conditions for enzymes to function and these are not met, then the reactions do not take place and the biological process slows down. Byo-Gon is a combination of xeronine and plant extracts. It has been proven to cause a shift from the anaerobic fermentation to an anaerobic respiration.

2.0 DISCUSSION

At the cellular level, Byo-Gon acts as an “on” switch, restarting enzymatic process and promoting more rapid cell growth, overcoming environmental conditions. The use of Byo-Gon has proven to cause a shift from anaerobic fermentation to anaerobic respiration with more rapid growth and activity of facultative bacteria. Byo-Gon also increases the activity of aerobic organisms resulting in a broad spectrum of more active microorganisms throughout the treatment system, depending on dosed amounts. So we started a trial based on this we start dosing Byo-Gon.

As we learn at Bioreactor courses the bacteria use the available oxygen in their environment as a source of energy. This process occurs in a condition which is known as aerobic environment. When the aerobic bacteria consume all available oxygen and no method of replenishing the oxygen is provided then these microbes will die. The aerobic bacteria then will become a food source for the bacteria that exist in the absence of oxygen. The process which continues without oxygen is known as an anaerobic environment. A specialized group of microbes that are capable of existing in either aerobic or anaerobic environments are known as facultative bacteria. These bacteria are chemotropism and can generate their own energy by either fermentation or by respiration. The claim is that it is these facultative microbes that benefit the most from the inclusion

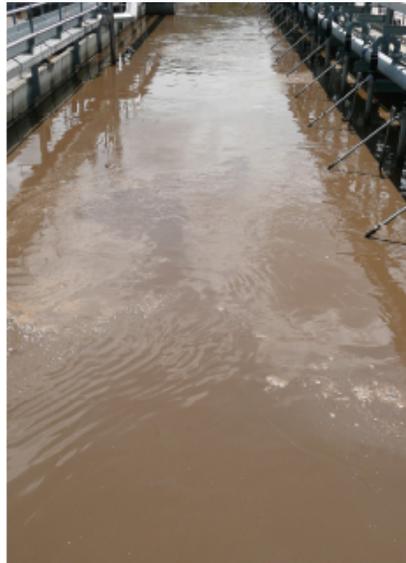
of Byo-Gon. We found a positive change in a week when dosing at a higher rate.

2.1 Scum Reduction

Due to an upset in the process we found that the amount of scum was increasing on Bioreactor 1. So we started dosing Byo-Gon at a rate 1ppm for two weeks. After one week we noticed that the scum had almost disappeared. However when the dosing rate was reduced to 0.5ppm we noticed some scum reappeared but not as bad as previously and without odour previously associated with Bioreactor scum.



Friday 25 October 2007



Friday 2 November 2007



Friday 25 November 2007



Friday 2 November 2007



This trial ran for 4 weeks on Bioreactor 1. It was in the last two weeks we noticed that the ammonia and total N in the plant was reducing in the final effluent.

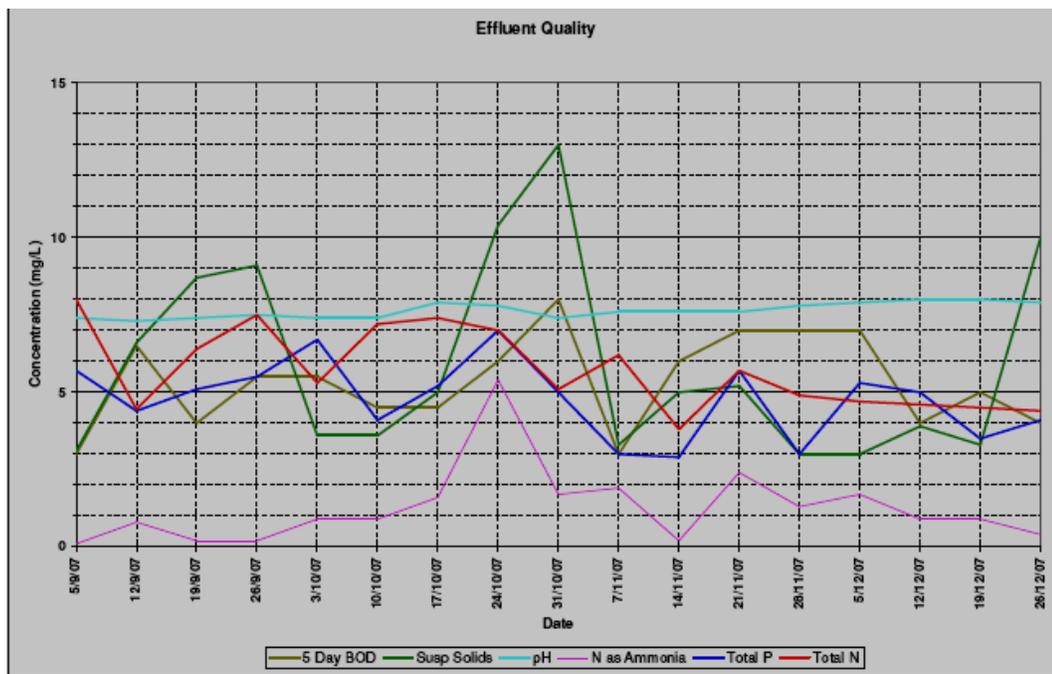


Figure 1: Shows 5 day BOD, Susp Solids, pH, N as Ammonia, Total P, Total N

As shown in the Figure 1 above, we started dosing Byo-Gon on Bioreactor 1 on the 25th of October 07 and finish on the 14th of the November. In this time the ammonia reduced from above 5.2mg/L to 0.2 mg/L. After we stopped dosing the ammonia had increased from 0.2mg/l to 2.4mg/L within a week. A new trial started in Bioreactor 2 on the 23rd November during the following weeks the ammonia started to decrease. Total N started to show signs of some reduction overtime and the scum also had some reduction within the same time frame. So now we are seeing some evidence that the micros are performing above what they were before the trial started.

In the Figure 2 below some improvement of the Effluent is evident. The Ammonia is still the same as the other trial but the total N and Total Phosphorus is showing some improvement. Ammonia leaving from the Bioreactor has improved in leaps and bounds. It has two areas where the ammonia has come up above 1.5ppm this is from problems with the aeration on one of the Bioreactor. The average of the trial is 0.7ppm of Ammonia.

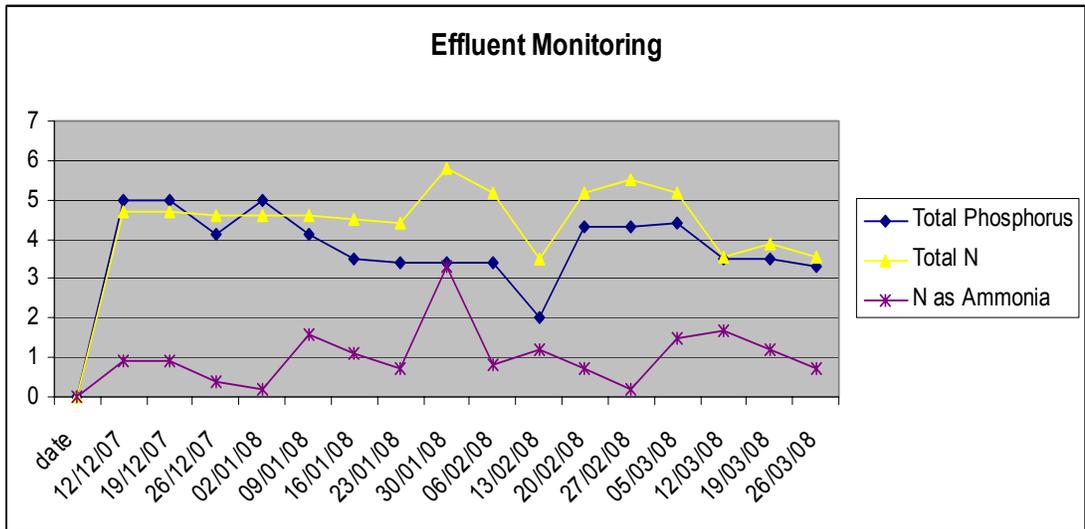


Figure 2: Ammonia and phosphorus levels

Figure 3 shows that Bioreactor number 2 started off great then increased because of the problems with the lack of air. But once they were corrected the ammonia dropped down. Problems also continue now and again. But still with these problems the Bioreactor was still under the requirements for ammonia.

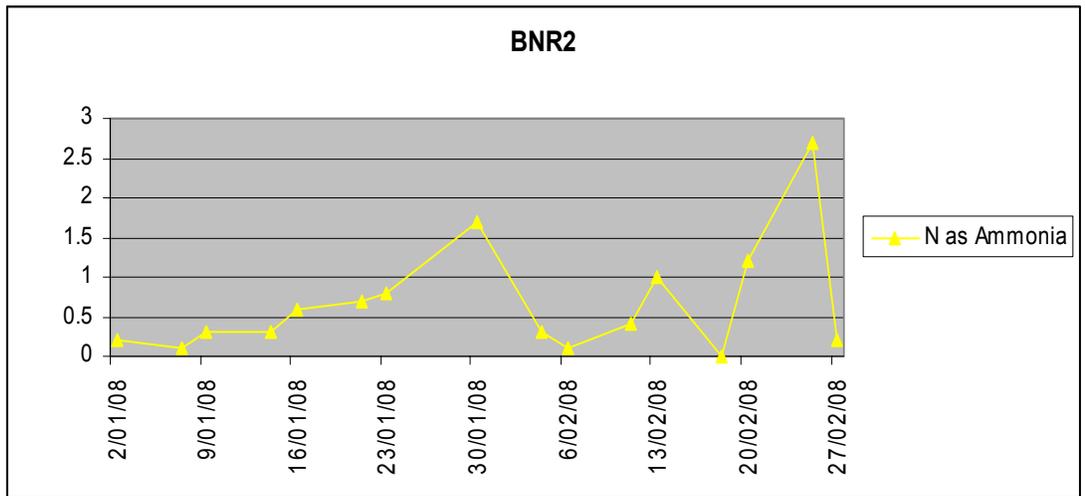


Figure 3: Ammonia levels

3.0 CONCLUSION

3.1 Outcomes of trial

When the trial started we did not know what would happen in the short term or long term as we have not used this product before. We did do Some Research which showed signs that it would work. But we needed to see this for our selves. So At the initial stage of a trial, the results did show signs of improvement of ammonia and after a while there was improvement with total N and total P. Total N was higher before the start of the trial around 6ppm. Now it is around on the short term 4.9ppm, long term 5 to 5.5 ppm. Total P also some signs of improvement. This improvement is due to the adding of Byo-Gon as it is the only thing that has changed in the Bioreactors. At a high dose rate we saw change in the amount of scum on Bioreactor 1 at the start of the trial. The Trial is still going, hope to see if it helps with some of the scum on the Clarifiers and Bioreactors over time at a low dose rate.

4.0 ACKNOWLEDGEMENTS

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