

**TYSON FOODS INC.
SHELBYVILLE, TENNESSEE
FULL TREATMENT WASTEWATER PLANT**

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INTRODUCTION:

In March of 2001, I was in need of a solution for several problems in our anaerobic lagoon. The lagoon had a grease cap of approximately six feet in thickness on the influent end, which was severely depleting my detention time for the lagoon. We were also experiencing increasing odor complaints from the lagoon. Odor complaints became more critical when lagoon sludge met the grease cap at the influent end, and sludge began to ooze through the grease cap.

At that point, the conventional wisdom that the grease cap will also be an odor cap was not applicable, since the sludge was now on top of the grease. The odor was creating a serious public relations problem with our neighbors.

As this situation was developing, I was introduced to a company called Envirotech, Inc., who visited my wastewater plant to survey the problem. The Envirotech folks told me of a microbial product that would deplete the grease cap and reduce odors to the point that we would not receive odor complaints. The product was called HGR, which stands for Heavy Grease Removal. We decided to give the product a try.

We started using HGR on March 12, 2001. Our odor complaint history for the early part of 2001 caused by the anaerobic lagoon was:

<u>MONTH</u>	<u>Number of Complaints</u>
February	11
March	7
April	1
May	0
June	1
July	0
August	0

During the first part of September, we were having problems with ammonia, so we stopped using the HGR for about two weeks. We received two odor calls so far this month, but we are now using the HGR again, and do not anticipate any more calls. The odor is not noticeable anywhere around the lagoon since we reintroduced the product.

TREATMENT RESULTS:

We now have a five month treatment history with the use of HGR. Simply stated, the product has performed more effectively and economically than I would have believed. The Envirotech personnel did not make any claims that were not proven by my treatment history. In fact, they were very conservative in their claims.

Some of the findings that we have made over the treatment period are as follows:

1. We have reduced the grease cap by a minimum of two (2) feet in thickness. To quantify that number, the grease reduction amounts to at least 16,000,000 pounds of grease or 30 to 40 percent of the grease cap destroyed in five months of treatment. We have used 300 pounds of HGR to date to achieve this reduction, which means that the HGR is reducing roughly 53,000 pounds of grease for each pound of product applied. This number is the mean reduction per pound of product. Continued treatment history would logically be expected to show this number increasing with treatment time. The cost effectiveness of the product is evident. The cost to rid the lagoon of grease is presently calculating at approximately \$1.15 per cubic yard. The lowest excavation cost that we have seen is \$4.00 per cubic yard, if we can land apply on company-owned land.
2. The grease cap is now in its final stages of remediation. An estimated 98 percent of the lagoon surface is no longer grease, but consists of intermediate breakdown products of grease that is being digested. Only a few protruding mounds of grease remain in the influent end of the lagoon. The remainder of the lagoon is totally flat, and the surface is of a spongy or gel consistency, indicating that the remainder of the grease cap is currently being digested up to the surface level.
3. After about two months of treatment with HGR, we had a major upset in the aeration basin from grease that was introduced by accident from a feed mill that periodically dumps boiler blowdown water into our aeration basin. This upset caused the ammonia level in our effluent to the river to reach 47 mg/L, and our discharge requirement is 40 mg/L average, with a goal of < 1.0 mg/L. Normally, it would take thirty (30) days to correct an upset of this magnitude. However, I was pleased to note that the next time the ammonia was checked, the level was 0.3 mg/L. We use a seven day test cycle for ammonia. I believe that this quick reduction in ammonia was due to a secondary beneficial effect that the HGR microbes had in the influent to the aerobic basin. There is no other explanation for this rapid recovery.

4. We were initially treating the anaerobic lagoon of 14 million gallon capacity with four (4) pounds of HGR per day, five days per week. We had to back off to two (2) pounds per day after a month of treatment. The product was breaking down the cap quicker than expected, and some of the residual breakdown products began to increase our solids in the aeration basin. We adjusted the treatment levels to account for the grease breakdown products, and the system stabilized quickly.
5. As the product continues to deplete the grease cap, we will be able to shut down our DAF and save about \$700.000 per day on land application of DAF solids. We now know that the product will dispose of the DAF solids in the lagoon at a small fraction of the cost of land application.
6. We have essentially overlooked lagoon sludge, since the grease cap and odor problems were the major concerns. During our initial month of treatment, the sludge that was oozing from under the grease cap ceased. Odor quickly dropped when the sludge was not coming to the surface, and the lagoon is apparently free of the volatile component of the accumulated sludge.
7. Since we have been able to reduce the grease cap and the accumulated sludge in the anaerobic lagoon, we have regained our detention time in the lagoon that is crucial to dealing with placement of wastewater during scheduled and unscheduled maintenance situations with the aeration basin. Without the reclamation of our detention time in that lagoon, such maintenance issues could quickly become critical.
8. Normally during the summer months, many large patches of liquid grease will emerge on top of the grease cap, and cause odors. This year there were only a few small patches of liquid grease that emerged, and they did not cause odors.
9. The BOD and COD levels in the lagoon effluent have remained in the following range during the treatment history:

BOD: 300 to 400 mg/L

COD: 600 to 700 mg/L

TSS and FOG have varied over the treatment period, due to breakdown products from the grease cap. Monthly average TSS and FOG levels are as follows:

<u>MONTH (2001)</u>	<u>TSS</u>	<u>FOG</u>
February	146 mg/L	53 mg/L
March 12 (begin treatment))	191 mg/L	76 mg/L
April	271 mg/L	44 mg/L
May	188 mg/L	62 mg/L
June	183 mg/L	53 mg/L
July	135 mg/L	49 mg/L
August	93 mg/L	39 mg/L

An analysis of the TSS and FOG levels show that after 6 weeks of treatment, the TSS and FOG levels peaked, and then begin to drop as the lagoon became fully inoculated by the microbial product.

10. It has been noted recently that much of the plant life that grows on top of the grease cap is gradually dying. The apparent reason is that the root structure of the plants is being eroded by the destruction of the grease cap.

CONCLUSIONS:

1. The treatment of our anaerobic lagoon with the HGR product has been extremely cost effective in grease reduction, the reclamation of our lagoon capacity, and the overall treatment process.
2. The elimination of odors from the anaerobic lagoon has already had an invaluable positive affect on our public relations.
3. Net cost reduction anticipated by shutting down the DAF is projected at approximately \$700.00 per day, or \$3,500.00 per week.
4. We anticipate that the removal of the grease cap should achieve an additional benefit. After the grease cap is removed or partially removed, surface water will allow nitrification of ammonia to occur. HGR bacteria will also aid in the denitrification of the lagoon, which should place less ammonia loading on the aeration basin. A subsequent report for ammonia reduction will be forthcoming.

