Egg Processor in Belgium Achieves COD Compliance & Reduces Odor with MICROBE-LIFT® Technology

Location: **Dion Vandewiele N.V., Zulte, Belgium**

Background:

Dion Vandewiele N.V. has engaged in the production of pasteurized liquid egg products since 1937. Between 3 and 4 million eggs are broken daily, 5 days a week, to produce egg-white, egg-yolk, and some mixed egg products for a total to 900- 1000 tons of end products per week.

The wastewater treatment plant was built 10 years ago and designed for 3 million egg-breaking capacity. At up to 4 million eggs per day, the system is over capacity. The key environmental problems include bad odor (mainly caused by hydrogen sulfide from rotten eggs), sludge build-up, and the inability to meet effluent COD permit levels. Their effluent was not in compliance with government standards.

The system was designed as follows:

1) **Collection tank, which allows for chemical treatment:** This is a 10,000 liter tank with influent flow of 150-170 cbm (million m^3/day), ranges in pH from 2-13, and COD concentrations from 5,000-35,000 mg/l. This waste contains 1-2% of egg plus cleaning chemicals (caustic, detergents, and nitric acid) and disinfecting chemicals (peroxide). Sulfuric acid used in the collection tank to neutralize the caustic (>333 liters/day) provides a second source of sulfur. System upsets occur when excess sludge is cycled back into this tank or a high spillage of eggs comes from the pasteurization units, where a blend of egg and water is passed through and wasted until the correct pasteurization temperature is achieved.

2) **Aerated basin:**
A small, aerated basin (which is covered to contain odors) receives 150-170 cbm/day from the collection tank. It has one surface aerator and is maintained at a pH of 7.6 to 8.2.

3) **Large aeration basin:**
The waste from the small aerated basin is discharged to a much larger 3200 cbm aeration basin. With an average retention time of 20 days, this basin has three surface aerators to suck waste from the bottom and spray into the air for aeration. During long-lasting warm periods, the surface may form a crust. If this crust breaks the odor is intolerable.

The egg plant works a five-day week. At the beginning of the week, the waste level in this aerated basin is at 3.5 meters (the minimum level at which the aerators can operate). By the end of the week, the waste depth approaches 5 meters, the maximum depth. 9-10 cbm per hour of wastewater are discharged to the flotation unit.

4) **The flotation unit:**
This unit sends 5-7 cbm per hour of water to the pond and 3-4 cbm per hour to sludge storage. Flocculation is accomplished by "polyelectrolytes" which keep the sludge (approximately 1/3 of volume) on the surface.

5a) Sludge storage tank:

This tank has a capacity of 700 cbm with aeration carpets installed on the bottom of the tank for further digestion. Solids content of this sludge is about 3%.

5b) Pond:

The water phase of the effluent from the aeration basin is discharged to the pond. This pond of 225 cbm contains a smaller 75 cbm Reed Pond and has a checkpoint for controlling release based on COD. The COD should not exceed 125 mg/l.

The sludge tank is the area with the most critical problems. As long as the sludge does not exceed half of the capacity of the tank, the existing carpet aerators are sufficient to feed the existing microbial population. However, when the sludge volume increases over half the capacity the tank goes septic with a sulfide odor that permeates the whole neighborhood. It is much more difficult to dispose of septic sludge often requiring decanting and incineration at a much higher cost.

Dion Vandewiele N.V. turned to Ecological Laboratories Inc., for their MICROBE-LIFT® wastewater technology. After fully evaluating the system, Ecological Laboratories' technical staff developed a treatment plan designed to achieve the following:

- Remove a major source of hydrogen sulfide (H_2S)
- Convert sulfide into elemental sulfur and then to sulfate (no odor)
- Improve biodegradation with a lower yield reducing the formation of sludge by 30-60%
- Clear pond of surface solids and consistently reduce the COD below 125 mg/l in the final effluent.

The treatment plan calls for the dosage schedule of MICROBE-LIFT® wastewater technology listed in the following chart:

Day	Small Aeration	Basin Aeration Basin	Sludge Storage Tank	Pond
		INOCULATION SCHEDULE		
1	5,0 gal	12 gal	6 gal	2.0 gal
		FIRST MONTH SCHEDULE		
7	2.5 gal	6 gal	4 gal	1.5 gal
14	2.5 gal	6 gal	4 gal	1.5 gal
21	2.5 gal	6 gal	4 gal	1.5 gal
28	2.5 gal	6 gal	4 gal	1.5 gal
		MAINTENANCE DOSAGE		
weekly	1.0 gal	2 gal	1 gal	1.0 gal

Note: If there is an extra toxic load of egg products, due to an incident in production, the system is already equipped to handle this and will prevent destabilization. However, it is recommended to use an additional dosage of MICROBE-LIFT® in response to such upsets to ensure stabilization.

In addition to MICROBE-LIFT® an additional product, MICROBE-LIFT®/OX is added to the sludge storage tank at least for the first two months of treatment to help provide enough oxygen to optimize the

action of the MICROBE-LIFT® technology. MICROBE-LIFT®/OX should also be added in conjunction with MICROBE-LIFT® if sludge storage exceeds its 50% capacity, since the air beds only produce enough oxygen to support 50% capacity of the basin. To apply OX, it should be slurried in a ratio of 1 kg OX to 3-4 liters of water prior to addltion.

Recommended dosage of OX to the storage tank along with MICROBE-LIFT®:

Day 1 – 175 kg
Day 2 – 175 kg
Day 28 – 175 kg
Maintenance – 50 kg bi -weekly

Results Achieved: The treatment plan was implemented in middle of May 2001. At this time the neighborhood was complaining about very bad odor and the plant owner was being threatened with plant closure.

Odor	COD influent mg/l	COD effluent mg/l	Visual Apperance of Effluent
Day 1: Very bad odor at small aeration basin & sludge storage polluted the entire neighborhood. (Most of the floating particles were skimmed off)	21,600	245	Cloudy water and a lot of coagulated particles in pond and in reed pond, hindering the growth of the reed.
Day 15: Bad odor was significantly reduced and limited to the small aeration basin and sludge storage tank	16,240	93	The water was becoming clearer.
Day 30: No odor observed in the small basin and only a small occasional odor-wave at the sludge storage tank.	15,400	70	Clear water in the pond down to the bottom (one meter deep)
Day 45: No odors detectible	16,500	70	Clear water

By day 15 the effluent was becoming clearer, the odor was reduced, and the effluent met the required COD parameter. By day 30, clear water was evident down to the bottom of the pond indicated the solids were being reduced.

The goals of the program were met:

1. No detectable odors remained
2. The effluent was clear water with reduced turbidity and solids
3. Effluent COD met specified permit limit

This plant will continue to observe trends particularly based on production and maintenance issues and will respond with increased dosages of MICROBE-LIFT® as necessary to maintain treatment excellence. With the resolution of odor problems and COD compliance the plant was no longer concerned about potential shut down.

For more information on MICROBE-LIFT® Technology contact

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