# Sludge Reduction & Cost Savings at Sequential Batch Reactor Plant in Southern Pennsylvania

**Location:** **SBR Plant in Southern Pennsylvania**

A 0.5 mgd SBR plant in southern Pennsylvania uses **MICROBE-LIFT®**/IND and **MICROBE-LIFT®**/OC and achieves the following improvements:

1. Maximizes throughput from aerobic digester to sludge press. If the digester gets full, they cannot remove waste solids from the SBR basins.
2. Reduces foaming in aerobic digester so blowers do not have to be turned off
3. Reduces filter press downtime for cloth washing
4. Decreases time and manpower requirements for the above-mentioned cleaning
5. Reduces chemical costs for filter press
6. Improves the effectiveness of UV disinfection
7. Makes it possible for primary contributors to increase their discharge flow to the WWTP facility
8. Makes it possible to operate plant at lower MLSS thus reducing foaming and filamentous
9. Better decant is possible in winter due to no frozen foam on decant trough
10. Net savings of over $2,000 per month

## Background

Plant personnel wanted to lower operational costs if possible but maintain good effluent quality. Also, foaming was a problem throughout the system. Aerobic digester blowers often had to be turned off due to excessive foaming, so the aerobic digesters, in effect, became anaerobic digesters. This resulted in the production of solids that settled poorly and were difficult to dewater and in the generation of filamentous bacteria. Foaming at the surface of the two SBR basins was not only unsightly, but it was a breeding ground for filamentous bacteria, and, when foam froze during winter months, decant trough function was impaired.

**Initial** evaluation of **MICROBE-LIFT®**/IND and **MICROBE-LIFT®**/OC had the following **objectives:**

A. Improve B.O.D. removal to reduce foaming organics
B. Reduce the quantity of sludge generated
C. Improve solids settleability and dewaterability
D. Improve plate-and-frame filter press performance, while lowering flocculation-aid chemical usage
E. Reduce operational costs

## Results: Before and After Comparisons

**I. Aerobic digester blowers** often had to be turned off because high levels of foam were generated and even overflowed the tank. An unavoidable consequence of this was that within minutes, anaerobic conditions would develop within the aerobic digester. This not only encouraged filamentous growth, but also resulted in significant solids deterioration. Solids in such a case do not settle well and are difficult (and expensive) to dewater.

IND and OC were added to the digester and within days **foaming was dramatically reduced** and blowers could be left on as per design specs.

**II. Loading and flow conditions were the same before and after treatment** with IND and OC began. Along the same lines, the average number of gallons of sludge waste per day from the two SBR basins did not change significantly. These factors are significant.

> In the 12 months before treatment began, an average of 27,810 gpd total was waste.
> In the first 12 months after treatment started, daily average wasting was 27,572 gpd.
> This is a difference of only 238 gpd. Therefore, the performance improvements **and cost savings achieved was NOT due simply to fewer gallons per day being waste.**

**III.** Since it had been observed that **foaming** was much more severe **on the SBR basins** at higher mixed liquor concentrations, there was incentive to reduce MLSS—but without decreasing plant performance or effluent quality. Specifically, they did not want to affect nitrification.

> In the 12 months before treatment began, average MLSS (of both basins) was 2,843 mg/lit.
> In the first 12 months after treatment began, average MLSS was 2,580 mg/lit, **down 263.**
> (Update: MLSS's can now be carried as low as 2000—and with improved performance.)

**At these lower mixed liquors, foaming was appreciably reduced, protozoal population was "younger," and biological floc settled (and dewatered) better.**

**IV.** With new cloths, the **plate-and-frame filter press** could get 90 runs/cycles/dumps between washings. Washing the cloths is an unpleasant, manpower intensive, ergonomically unfriendly task—not to mention that cake quality deteriorates as you get closer to the limit of the runs.

Except with new cloths, the average number of runs between washes was 32. After treatment with IND and OC began, **average number of days between washings went up to 110.** Press cake was higher quality as well. Better removal/degradation of fats, oil, and grease by the microorganism in IND and OC is the primary reason press performance is improved.

**V. Sludge cake** is transported to landfill where it **is weighed.**

Average monthly weight of this sludge cake **before** treatment with IND and OC:

**155.4 Tons/month**

Average monthly weight **after** treatment began:

**60.2 Tons/month**

This represents a 61.3% reduction in the amount of sludge cake disposed of per month on average

**VI. Aluminum chlorhydrate (coagulant) cost reductions:**

**Before** treatment: **15,648 gallons used in 6 months**
**After** treatment: **10,876 gallons** used in the corresponding 6 months

This represents a **30.5% reduction** and very considerable **cost savings** at $4.33 per gallon. **($21,000.00)**

**VII.** A UV array is used at this plant for **disinfection** of final effluent. The higher the transmittance of UV rays, **the better** the disinfection.

**Before** treatment: average transmittance was **23%**
**After** treatment: average transmittance was into the **mid 40%** range, a near doubling.

**VIII.** The above-mentioned improvement in UV transmittance made it possible for the WWTP to **lift** the **cap on the leachate flow** it received from the local landfill when necessary (after heavy rains, e.g.).

**Before** treatment: **35,000 gpd 6 days a week** was the limit on the landfill leachate flow
**After** treatment: **50,000 gpd 7 days per week if necessary**

**Note:** The landfill leachate has a tint to it. This was the original reason for the daily cap on flow from the landfill. Please note that the improved UV transmittances reported in Point VII above occurred even in light of the increased flows from the landfill reported in Point VIII.

**IX. Net savings** for this 0.5 gpd plant was an average of **$2,200 per month**, excluding reductions in manpower costs (for press fabric washings). Dosage of **MICROBE-LIFT®** /IND is 3 gallons per week. Dosage of **MICROBE-LIFT®** /OC is also 3 gallons per week. Addition point was directly into the aerobic digester for 3 months to seed it, then to the headworks thereafter.

For more information on MICROBE-LIFT® Technology contact
**Ecological Laboratories Inc.**
www.EcologicalLabs.com
CS13119