

Case Study: California Poultry Food Processor

Background

This facility processes, seasons, cooks, and flash-freezes poultry for the food industry. They process about 500,000 lbs. of chicken per day and are trying to increase their production. Their existing wastewater system was limited in its ability to meet the discharge requirements to the local POTW and was therefore required to meet these limits as a condition of their expansion. To expand production, the facility was looking at a tremendous capital improvement cost to increase the size of their wastewater pretreatment treatment plant to handle the expected higher flows and loadings.

The facility had problems with levels of TDS/EC's, wet sludge that was expensive to dispose, poor coagulation/flocculation control, carryover of floc into their effluent, throughput limitations due to the poor coagulation/flocculation performance, high chemical costs, among others. In addition, the City is planning to levy surcharges for EC/TDS due to their noncompliance with their NPDES permit.

Past Operations

On the average, the facility treats 180,000 gpd, operating 10-1/2 hours per day, 5 days per week. Wastewater from the various poultry-processing operations flows to a common sump and is then pumped through a rotary screen (to remove the large solids) and flows to 500,000 gallon Equalization tank. The wastewater is pumped from the bottom of the EQ tank at 275-300 gpm to their DAF system. The wastewater is pH adjusted (in-line) with caustic or acid to meet the near neutral setpoint of 7-8 pH. After pH adjustment, an aluminum based inorganic/organic coagulant is added, followed by a cationic and then an anionic flocculants. The wastewater is mixed/flocculated in the DAF floc-tubes with dissolved air addition and the float solids rise to the surface. The solids are skimmed off and pumped to an 8,000 gallon holding tank and the treated liquid effluent flows to the Cities wastewater facility.

Existing Process

The existing process used 5 chemicals: caustic, acid, coagulant, cationic flocculant, and an anionic flocculant. The operator spends several hours each day transporting, blending, mixing, and adjusting the feed rates of these different chemicals. The existing treatment process requires tight pH control for effective coagulation/flocculation, but this is very difficult to maintain due to various products they process inside the plant. When the pH is out of the 7-8 pH range, the effluent water quality decreases and the resulting sludge is difficult to handle due to its wet and slimy nature.

The sludge was being hauled off at an expense of \$15,000 per week. The facility attempted to dewater the sludge, but the chemistry in use did not allow release of the water entrained in the sludge.

Chemical Usage Rates

In an average month the processor used 8 drums each of caustic and acid; 3,300 gals of coagulant; and 2,000 lbs each of the cationic and anionic flocculants. The average monthly chemical cost was \$22,000 and the sludge haul off cost was \$60,000 for an annual average cost of \$894,000. In addition, there was an impending surcharge from the City for BOD, TSS, and EC's.

Wastewater Quality

	Old Chemistry	Floccin-J	% Decrease
BOD	410 mg/L	200 mg/L	51%
TSS	240 mg/L	20 mg/L	92%
EC	1,700 umho/cm	1,300 umho/cm	24%
TDS	1,400 mg/L	950 mg/L	32%

The Trial using Floccin-J

The addition of the Floccin-J product required some small changes in the systems operation. In order to feed product into a pressurized line, the Floccin Feeder system was modified: the auger of a standard feeder was set to deliver product into a second "slurry tank." (Makeup water for the slurry tank was taken right from the wastewater line exiting the EQ tank.) After mixing, the slurry was pumped straight into the DAF feed line upstream of the flocculation tubes. The resultant effluent quality was greatly improved, as shown in the above table. The DAF cake was more consistent, much drier, less shear sensitive, and more easily dewatered than with the previous chemistry. The pH swings from 4.7 to 10.8 and the Floccin-J works very well even with these pH swings.

With the increased solids content, sludge disposal is no longer a problem or cost to the facility. The sludge is hauled away at minimal cost and is used as addition to silage.

Trial Results

The goals for the trial were:

- To optimize the treatment process and allow increased production without capital outlay.
- To simplify the wastewater treatment process, reducing the operators' workload and exposure.
- To reduce the EC/TDS in the effluent and avoid/minimize proposed surcharges.
- To increase the solids-content of the sludge and reduce disposal costs.

The trial was successful in meeting all of these objectives.

Benefits

The use of Floccin-J reduced the number of on-site chemicals from 5 to 1. Floccin-J works in a wide range of pH values (4.7 to 10.8) and is much easier to control; the operator simply adjusts one speed-control dial instead of several chemical feed pumps.

Cost Comparison

	Old Chemistry	Floccin-J	Savings
Total Daily Cost	\$2,734	\$897	\$1,837

The cost of the old chemistry was \$1,410/day as compared to \$897/day with Floccin-J. The sludge disposal fee was \$1,600/day with the old chemistry; this cost has been eliminated with the Floccin-J. The surcharges are yet to be determined but will be much less with the Floccin-J due to increased removal efficiencies for EC and TDS. (See Wastewater Quality Table.)

Conclusion

Floccin-J has been a real success story. It has simplified the system, allowing the poultry processor to run a more consistent process, obtain better quality effluent and sludge – with less operator intervention. The daily chemical/sludge hauling costs have been reduced by 70%. Best of all, the processor is free to move forward with increased production without the expense of expanding the wastewater treatment plant.

***Integrated Engineers, Inc.** is a company specializing in industrial wastewater treatment. They have several clients that are reusing their wastewater and have achieved ZERO discharge. Integrated Engineers, Inc. provides consulting, equipment, and chemicals to the industrial wastewater market.*