



CASE STUDY

COMPANY: American Dye and Finishing

SYSTEM: Clarifier in Waste Water Treatment Plant

Situation:

American Dye and Finishing has functioned primarily as a Dye house for the last 25 years. Due to a shift in marketing 18 months ago, their finished cloth dye wear, which was completed in Ephrata, PA, has been shipped to their new plant in Honduras. The only dyeing of cloth left in Ephrata is a much smaller volume of piece dyeing. This has caused a reduction of the dye processing in their Ephrata plant but created needed space to consolidate their bleaching operation from a second local plant.

Due to this shift in the manufacturing processes, the waste stream characteristics drastically changed and created several challenges. Color removal, which is of paramount importance to the local POTW, remained an issue, and the added concern of how the bleaching process would affect the waste water plant's clarifier became our focus.

Goal:

Although a dramatic change in processing occurred that would affect the plant's wwtp, the American Dye and Finishing plant needed to operate continually to meet customer demands without interruption while meeting all of the POTW discharge parameters.

Problem:

The scouring and bleaching of fabric in the plant's operation was not consistent on a daily basis. The increased use of hydrogen peroxide and bleach was concentrated in small time periods as they dumped to the **screens** in the wwtp and into a 160,000 gallon composite tank.



Shortly after these dumps would occur, without notice, the **clarifier** would begin to sparkle across the surface, as oxygen entered the clarifier. Almost without fail, this phenomenon would be followed by the sludge bed rising at an alarming rate and the sludge would begin to overflow the clarifier weir and if not caught, be discharged to the local POTW.



Analysis:

The first time this happened I called on Dave Grottenthaler and Paul Rey to assist me in finding a solution to the settling situation. Together, we discovered that increasing the lime feed rate by 0.5 pH units to the clarifier, followed by increasing the KR-F1420 anionic polymer feed rate from 2 ppm to nearly 50 ppm, we could settle the solids in the jars much faster.

We also stole an idea from a problem that Dave has had in one of his steel mill clarifiers and placed a submersible pump 4-6 feet down (level indicated using a sludge judge) into the rising sludge layer and began to re-circulate solids back to the center well of the clarifier with a temporary hose.

At a point when the plant was going to shut down within an hour, which would have been disastrous for the plant, the sludge judge began to show improvements in the clarifier. Within several hours, the sludge had settled down to near normal levels at 8 feet below the surface.

Problem Resolution:

1. We implemented an SOP that the operator must log sludge levels each hour due to the quick rise of the sludge when the oxygen appears in the clarifier.
2. We changed the Sodium Bi-Sulfite feed from manual to automatic by changing the characteristic of the Bi-Sulfite from solid to liquid eliminating operator error. This has allowed Kroff to supply commodity liquid Bi-Sulfite in bulk since February of 2004.
3. We used a hand held ORP meter to discover that influent wwtp water varied from +600 to -250. By having the operators take readings every hour for 1 work week, we were able to establish that the clarifier didn't show signs of sparkling and the sludge didn't rise at composite tank influent to clarifier ORP readings of +200, but did show signs of the problems listed above with readings over +300.
4. We installed an ORP monitor and control function with a Pulsafeeder pump that could receive a 4/20 milliamp signal within the volume range necessary to give us <+200 ORP readings consistently.



5. We evaluated the plant procedure of running the wwtp plant influent from the composite tank at 310 gpm and having to shut down wwtp operations when no water was available. This created a small volume of water to be in the composite tank at times when a dump of bleach or peroxide came down and concentrated the oxygen going to the clarifier causing sludge upsets. We set up an SOP of running the composite tank at 280 GPM and not starting the wwtp unless there was 40% or more composite tank capacity to work on.
6. Created an SOP that when the sludge level hits 4 feet from the top of the clarifier that our emergency procedures of increasing the lime feed, increasing the polymer feed, and utilizing the submersible pump to pull solids back into the center well as described above go into place.

Summary:

Last year I spent 4-6 (half or full days and nights) per month at American Dye and Finishing, and although it's one of my largest accounts, it was very trying.

This year we've had only one rising sludge situation which was caused by a bulk tank cleanout and someone dumped an entire drum of sulfuric acid into the waste stream.

Kroff has been able to enjoy a profit increase of nearly \$16,000 since we've shipped liquid Sodium Bi-Sulfite and most importantly, the plant has the piece of mind that they can operate without a disaster looming.

Duane Renko
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