

Case Study
Champion Paper Company
375 Muscogee Rd.
Cantonment Florida, 32533

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This report was provided at the request of Mill manager, Mr. Doug Owenby (850) 968-2121

Aeration and Mixing in Primary Stabilization Basins 1 & 2

In August 2004, tests were conducted on 2 Primary Aerated stabilization basins with approximately 2,200 horse power (hp) of aeration capacity. The 2 Basins consisted of approximately 12.3 surface acres with an average water depth of 12 ft.

The wastewater treatment system is designed based upon an annual average daily flow (AADF) of 23.8 MGD of industrial process wastewater, storm water associated with industrial activity, and pretreated sanitary wastewaters, which are associated with a kraft pulp mill which produces a combination of 1,579 Air-dried tons (ADT) of Integrated production of unbleached linerboard Kraft paper and 465 (ADBT) of Integrated production of bleached Kraft pulp.

The current wastewater treatment plant's multi-pond primary and secondary treatment system, consisting of a primary treatment system (bar screen, dual primary clarifiers, polymer addition, multi-purpose surge basin), and secondary treatment system (four ponds in series; two aerated stabilization basins with approximately 2,200 horsepower (HP) of aeration capacity, a nutrient feed system, two non-aerated polishing ponds and a final riffle section to re-aerate the effluent), will be modified. Primary sludge is treated in a flocculation tank, then gravity flow to rotary screens and the screw press. Sanitary waste is pretreated separately before mixing with process wastewater. A system of lift stations pump sanitary wastewater to a 0.060 MGD package activated sludge plant for biological treatment. Treated effluent from the activated sludge plant is pumped to the bleach plant acid sewer before subsequently combining with other process wastewater before entering the wastewater treatment facility described above for further treatment.

With the use of infrared aerial photography, it was determined that surface aeration equipment was not providing the required mixing, allowing sludge to accumulate at an average depth of 6.4 ft.

Extensive testing determine oxygen levels to remain steady at .65 ppm with in the first 36 to 48 inches of the water column and diminishing to almost 0 ppm at a depth of 96 inches and below. Surface Water temperatures ranged from 135 degrees Fahrenheit (north side) at the invert to 125 degrees Fahrenheit on the south end of the basin within the first 24 inches of the water column, and decreasing to an average of 86 degrees Fahrenheit along the bottom.

It was concluded that the lack of oxygen transfer was prohibited by several factors: 1) water temperature above 125 degrees Fahrenheit, 2) sludge build up, & 3) lack of proper mixing.

Solution:

- 1) Section off a portion of the basin located at the invert using floating curtains. This will provide a cooling off channel, reducing the overall water temperature by an estimated 5 to 10 degrees Fahrenheit.
- 2) Install DO2E floating aerators / mixers that provide proper aeration & mixing. The addition of mixers strategically located throughout the basin would destratify the water, suspend the sludge for faster digestion, and assist in cooling down the overall basin temperature.

Tests were conducted using 8 each 7.5 hp double flow DO2E floating aerators / mixers for a period of 180 days.

Results

- 1) Decrease in overall water temperature by an average of 4.6 degrees Fahrenheit
- 2) Reduction in basin sludge by 40%
- 3) Oxygen levels increased from an average of .65 ppm to 1.05 ppm
- 4) Reduction in power consumption by 35%
- 5) Reduced hp require from existing aerators

Conclusion;

By installing the proper number of floating aerators / mixers throughout these 2 basins, Champion Paper Company will be able meet and exceed the effluent discharge requirements as established by the EPA.

With the implementation and strategic location of approximately 30 – 7.5 hp DO2E double flow floating aerators / mixers in each basin, there will be an estimated energy savings of 60% annually (1.6 mill. Dollars) reduce annual maintenance cost by 50% (\$185,000), and a reduction of \$3.5 million annually in EPA fines for improper discharge of effluent.

All tests were conducted by and under the direct supervision of Champion Paper Company's environmental management division. All test results were conduct onsite at the Champion Paper Company lab located in Cantonment Florida.

Consulting services and equipment were provided by DO2E in., Pensacola Florida office.