

## **Northern New Jersey (March, 2001):**

Plant Capacity: 6 mgd

No. of Clarifiers: #1-#5 -- 70' long x 14' wide x 9' deep rectangular (covered) clarifiers; #6 -- 60' square x 13' SWD w/ scraper sludge collection.

Clarifier Description: Clarifiers #1-#5 are of a conventional chain and flight configuration, scraping sludge towards a hopper at the inlet end. Several of them had been modified to include in-tank baffles to eliminate short-circuiting. Clarifier #6 was a conventional "squirele" (square clarifier with a pantographic arm on the sludge collectors). The entire clarifier battery often produced an effluent in excess of the 30 mg/l permit limit.

Project Objective: to determine why these clarifiers were performing so poorly by examining the hydraulic characteristics of the clarifiers. Based on their performance, make recommendations for improvements.

Project Approach: Test both clarifier configurations under conditions of "normal" flow and "high" flow. Using procedures outlined by the ASCE Clarifier Research Test Committee, perform tracer tests to determine hydraulic characteristics and flow patterns. Using CPE Services procedures, perform full depth current measurements for velocity profiles, and monitor blanket movements using extensive "vertical solids profiles" (VSP's).

Test Conditions: Test flows were at 520 g/sf/d and 1020 g/sf/d. The MLSS was 2700 mg/l and the SVI was 80.

Observations: The rectangular clarifiers had dramatic short-circuiting symptoms. The dye reached the effluent weirs in 15 minutes and the currents were in the range of 6 to 7 fpm. The effluent TSS increased from a normal range of 15 mg/l to almost 100 mg/l at the high flow condition. We also observed that the flow distribution among the clarifiers was extremely uneven. By dewatering the clarifier, we could see that the in-tank baffles were of an unusual configuration that would tend to increase, rather than decrease, the short-circuiting.

The squirele performed much better, but its effluent TSS still deteriorated from 13 mg/l to 28 mg/l at high flow.

Conclusions: Modify Clarifiers #1-#5 with multiple in-tank baffles of a configuration that is conducive to reducing their currents. Install a set of effluent flow monitoring weirs to assist the operators in balancing flows. Modify Clarifier #6 with a new "LA-energy-dissipating inlet".

Follow-up: The new baffle configuration in the rectangular clarifiers has almost doubled their actual detention time, and markedly reduced their effluent TSS, especially under high flow conditions.



