East Coast

Project Description: Located at a 240-mgd step aeration plant, there were three large rectangular (Gould Type II) clarifiers following a 22-mgd BNR "pilot" plant. Project objectives were to (a) establish a flow control system for the pilot plant clarifiers, (b) conduct a full field evaluation of the clarifiers, and (c) make recommendations for improvements.

Findings: The data from this evaluation confirmed the presence of a density current near the top of the sludge blanket at 8 mgd (700 gal/sf/d) reaching **12 fpm**. At the higher flow rate (14 mgd – 1200 gal/sf/d), the current was somewhat less concentrated but reached velocities of 10 fpm in the influent section and as high as 6 fpm downstream of the central sludge hopper. At the higher test flows, these currents are responsible for the transport of settled solids beyond the sludge hoppers where they could lead to the excessive loss of solids in the effluent.

Recommendations: We have used baffles, both slotted and "solid", to improve conventional rectangular clarifier performance for many years. Baffles in Gould Type 2 clarifiers were relatively unknown. However, we have installed such baffles successfully in other Gould Type II clarifiers (e.g. Yonkers, NY) and believed that they would be an improvement here. Accordingly, we recommended three different configurations ….. a different one for each of the three clarifiers.

Problem: A subsequent Computational Fluid Dynamics (CFD) model (by others) indicated that the insertion of <u>even a single</u> in-tank baffle would cause a deterioration of the effluent TSS (ETSS). To refute this model, we presented the actual flow curves from another similar large clarifier project (Edmonton, CAN) where the insertion of two such baffles markedly increased the hydraulic detention time and ETSS.

The Solution: The modeler reworked the CFD model. The revised model then agreed with our previous field experience …… and the same single baffle was inserted into each of the clarifiers. While there was no longer an opportunity to compare the various recommended baffle configurations, the insertion of the simple single baffle was later deemed a success.

What Did We Learn?: Good field data trumps CFD modeling projections.