Western Pennsylvania Project (June, 2001):

Plant Capacity: 20 mgd

No. of Clarifiers: #1-#6 …. 103'diam (octagons); #7-#10 ….108' diam. RimFlo

Clarifier Description: Clarifiers #1-#6 originally were fed from opposite ends ..…with several cross launders. They were later re-configured as centerfeed clarifiers with serpentine launders. Clarifiers #7-#10 are RimFlo (peripheral feed / peripheral effluent launder). All clarifiers are 12' sidewater depth with relatively flat bottoms and have suction manifold sludge collectors.

Project Objective: to determine the hydraulic characteristics of the clarifiers, and, based on their performance, make recommendations for improvements.

Project Approach: Test both clarifier sets simultaneously under the same 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: The Normal flow tests were conducted at 600 g/sf/d overflow rate and 14 lbs/sf/d solids loading rate. The High flow tests were conducted at 900 g/sf/d and 18 lbs/sf/d. The MLSS was 1800 mg/l and the SVI was 140.

Observations: The octagonal clarifiers had strong short-circuiting currents at the floor, in the range of 7 to 9 fpm. Blankets were unable to form, especially in the centerwell area. The peripheral feed clarifiers performed as designed, with currents in the range of 4 fpm at the bottom towards the center, and reverse currents at the surface from the center towards the peripheral launder. Blankets in the RimFlo clarifiers were maintained routinely 3 to 5 feet deep by the operating staff in order to thicken the stored sludge solids prior to wasting.

Conclusions: Modify Clarifiers #1-#6 by adding a new centerwell, changing the effluent launders to a standard circumferential shape, and adding a Crosby cylindrical baffle. We also recommended that the client consider totally reconstructing these clarifiers in view of the number of performance-limiting design conditions that would still remain. (Note: It is unusual for us to recommend a reconstruction of a clarifier. Generally, a clarifier can be improved by implementing simple modifications and control strategies.)