High Rate Sedimentation - Plate Settlers

HRS - Plate Settlers

Can the upflow velocity in the AguaClara sedimentation tank be significantly (factor of 2 to 10) increased without degrading performance?

What geometry is required for the floc blanket section of a high rate sedimentation tank?

Is it important that the floc blanket section of the reactor (including any internal components designed to increase floc blanket concentration) have an axis of symmetry that is vertical to eliminate excessive transport of flocs by gravity in a horizontal direction?

Do variations of geometry of plates (zig zag, porous, sloped or horizontal, or other geometries) increase the concentration of a floc blanket at high upflow velocities?

Should the plate settlers be submerged (perhaps 2.5 cm) in the floc blanket?

Spring 2016

Sedimentation is the slowest process in the flocculation, sedimentation, filtration treatment train. Currently, AguaClara sedimentation tanks are less than half the height of traditional sedimentation tanks, but they also are looking into methods of reducing the plane view area. This can only be achieved if there is a higher upflow velocity through the sedimentation tank, and would in turn greatly decrease plant construction costs.

Any significant further reduction in size of AguaClara facilities will likely be in the sedimentation tank. The current design sedimentation tank upflow velocity of 1 mm/s was set prior to 2010 in an effort to produce efficient sedimentation before AguaClara had invented the StaRS filter. Later that upflow velocity was determined to be in an efficient range for floc blankets. The challenge now is to invent an ultra-high rate sedimentation tank with upflow velocities between 2 and 10 mm/s. The plate settler capture velocity of 0.12 mm/s could be increased somewhat, but with a much higher upflow velocity the spacing of the plate settlers may need to be decreased and/or the length of the plates increased.

The constraint of approximately 1 mm/s on upflow velocity for the floc blanket has evolved because higher upflow velocities will produce very dilute floc blankets or no floc blanket because there are few flocs that settle much faster than 1 mm/s. However, it may be possible to invent a whole new approach to floc blankets that will facilitate higher upflow velocities.

Plate settlers can easily have a capture velocity that is 1/10th the upflow velocity. Thus it might be possible to design plate settlers for an upflow velocity of 2 to 10 mm/s and a capture velocity of 1 mm/s. The 1 mm/s capture velocity would capture the same flocs that are normally captured by an AguaClara floc blanket. This semester, the plate settler team will focus on designing different plate geometries to concentrate the floc blanket and increase floc size. Some designs to potentially look into are porous and zigzag plates, which will lie in the floc blanket.

Members

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Documents

	Challenges	Tasks	Symposium	Final Presentation	Final Report
Spring '16			? Unknown Attachment	? Unknown Attachment	