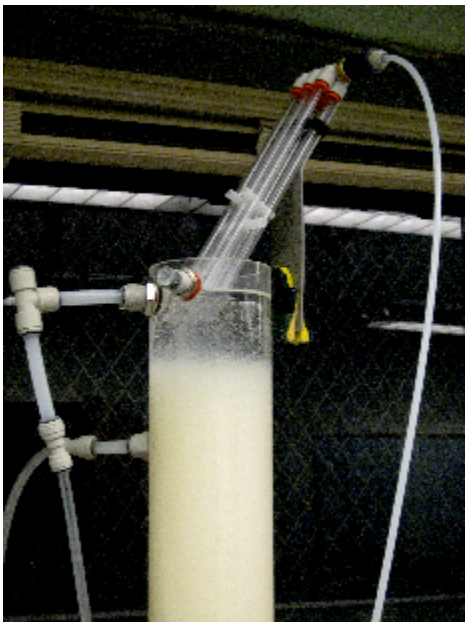
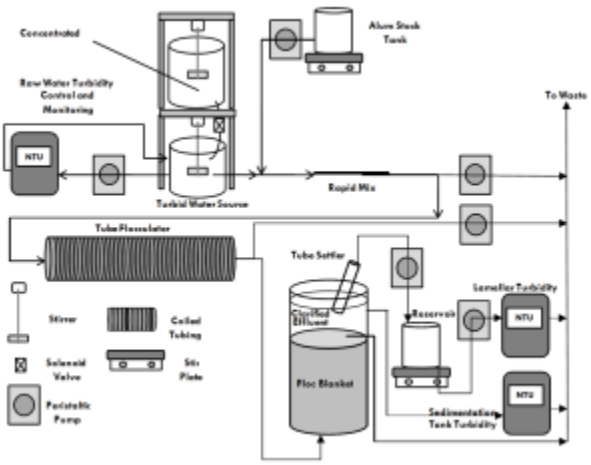
More Information





More Information

Plate Settler Spacing research focuses on developing a more thorough understanding and optimizing the lamellar sedimentation process of AguaClara plants. Currently the plants use lamella, which are a network of stacked, sloped plates with narrow channels between them. These are used to provide more surface area for particles to settle out, thereby significantly decreasing the sedimentation tank plan area. As water flows up through these channels, coagulated dirt particles are caught by the plates and fall down into the sedimentation tank. In the lab the Plate Settler Spacing Team (PSS) uses tube settlers to simulate the effects of lamella, where different tube diameters represent different spacing between the plates. The performance of these two technologies are comparable after adjusting for geometric differences, and results from bench-scale experiments can be applied to plate settlers. The team is focusing on a failure mechanism called floc roll-up, where high velocity gradients near the wall (present in small diameter tubes or at close plate spacings) overcome the floc particles' settling velocity causing flocs that would otherwise be captured to roll up into the effluent. Velocity Gradient theory (detailed in the PSS Fall 2010 Velocity Gradients Experiments) dictates that performance deterioration due to floc roll-up will be more significant for tube settlers than for plate settlers, given that the tube diameter equals the plate spacing. This is due to the geometric differences between tubes and plates, so using tube settlers for the bench-scale system represents the worst case scenario for failure.

Since we are unable to control the turbidity level of the influent water entering the AguaClara plants, there is a significant interest quantifying plate settler performance over a wide range of field conditions. Nephelometric Turbidity Units (NTU) is a measure of solution's turbidity based upon how much that solution scatters light. On the laboratory scale, the team has produced finished water that meets the US drinking water standard of 0.3 NTU. Laboratory conditions, however, are an idealization of field conditions and may not completely be representative of field performance. The team's research thus far has used an influent solution of pure clay; however, the existence of natural organic matter in rivers and streams may result in worse plate settler performance. The PSS team's objective is to optimize the lamella design in order to achieve 1 NTU finished water or less, even under water chemistry fluctuations. If filtration technology proves feasible in the field, this would also ease the loading on the downstream filter. Some of the fundamental parameters which control the design of our experiments are plate spacing, capture velocity, and the formation of velocity gradients between the plates.

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Members

Adela Kuzmiakova
Ashleigh Sujin Choi
Cosme Somogyi
Ying Zhang

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