

# Floc Blanket Research

## Floc Blanket Research

### Motivation

AguaClara is committed to improving drinking water quality in Honduras through the design and construction of gravity-driven water treatment plants. High concentrations of suspended and colloidal particles can increase the prevalence of pathogenic organisms, interfere with disinfection, and negatively impact drinking water quality. The goal of the AguaClara project is to provide an average effluent turbidity of less than 1 NTU (Nephelometric Turbidity Unit) after sedimentation to achieve a high level of water treatment, thus, a crucial component of design is optimization of the sedimentation tank.

We have built a laboratory scale plant to simulate a water treatment process sequence of rapid mix, flocculation, and sedimentation plate settlers to accomplish removal of colloidal particles. We hope to optimize performance of this plant to achieve an effluent turbidity after sedimentation of less than 1 NTU for a large range of turbidities.

### A brief history of sedimentation in AguaClara

La 34, the first plant designed by AguaClara, utilized horizontal sedimentation. The goal in design of horizontal sedimentation is to design a capture velocity of the tank that was less than or equal to the terminal settling velocity ( $v_s$ ) of the smallest particle size to be captured. We can approximate terminal settling velocity ( $v_t$ ) based upon Stoke's law for a spherical particle. Once a particle has settled, it may be resuspended if there is not relatively uniform, quiescent flow in the tank. Inlet design is additionally important to ensure that flocculated particles are not broken up.

The next version of sedimentation design occurred at the Ojojona plant that utilized vertical sedimentation with plate settlers. Vertical sedimentation with plate settlers can give as good or better performance while utilizing a smaller surface area as compared to horizontal sedimentation with plate settlers. A typical capture velocity for plate settlers in vertical sedimentation is 10 m/day. The sedimentation design has further advanced with our newest design in Cuatro Comunidades utilizing a vertical flow floc blanket clarifier.

### What is a floc blanket?

At appropriate upflow velocities, solids concentrations can build in the sedimentation basin while remaining suspended. These suspensions are called floc blankets. A floc blanket is a concentrated, stabilized, suspended bed of flocculated particles with a relatively clear effluent layer above. Upflow clarification with a floc blanket is thought to enhance particle removal owing to increased chance for particle-particle interactions, filtration, and further flocculation of particles.

Floc blanket stability is maintained by a balance of the hindered settling velocity of particles in the floc blanket against the average upflow velocity in the clarifier.

### Research Goals

Please select a website for specific goals semester to semester.

[Fall 09 Research Goals](#)

[Spring 09 Research Goals](#)

### Thesis

An online copy of the M.S. thesis can be found [here](#).