

msb358

Michelle Bowen's Individual Contribution Page

Spring 2016 Contributions

This semester I am on the Enclosed Stacked Rapid Sand (EStaRS) Filtration team. EStaRS is a smaller, self-contained version of the full size StaRS filter in use at AguaClara plants, and it is designed for use in smaller communities where a full size plant is not needed. This semester we will be improving the filter through both design and research. On the design side, we will be setting up a system of manometers to determine if the sand bed is fluidized during backwash, and we will be constructing a model of the manifolds and connections that will be necessary for a 60cm diameter filter. On the research side, we will be testing the reliability of the filtration to backwash to filtration transitions, and we will attempt to develop a mathematical model for head loss through the system in backwash and filtration modes.

Fall 2015 Contributions

I was on the Stacked Rapid Sand Filter Injection and Extraction (StaRS FINE) team this semester. The StaRS filter, an AguaClara invention that allows for gravity-powered filtration and backwash, originally used slotted pipes to inject and extract water from the sand-filled filter. These slots have begun to show clogging problems, so a new system was developed for injection and extraction. The Spring 2015 team finalized the injection system and fabricated an extraction system. This semester, we tested the extraction system that was designed last semester to see if it performed as expected. Over the course of the semester we confirmed that the new injection system worked properly, but we found that the new extraction system did not perform well enough for use in full size filters.

Spring 2013 Contributions

This semester I was a member of the Depth vs. Sand Filtration team. Our goal for the semester was to understand the differences between depth and surface filtration and the parameters that determine which type of filtration occurs. We first did a literature search of existing research before designing a system to mimic both typical downflow filtration and the subsurface injection process used in AguaClara filters. Once we constructed our apparatus we did several experiments in which we varied parameters such as flow velocity, influent turbidity, and coagulant dosage.

Fall 2013 Contributions

This semester I was a member of the SRSF Theory team. Our main goal was to parameterize the performance of AguaClara's SRSFs. We designed and constructed a new filter column to accurately model an SRSF, which was then be used to run experiments measuring head loss, influent turbidity, and effluent turbidity. A significant challenge we faced was figuring out a system which would allow us to run the filter at a relatively constant influent turbidity; this required us to implement and adjust PID control through Process Controller. When this task was completed, we began running experiments at varying coagulant dosages and analyzing the data for consistent trends.