

Rachel Proske's Individual Contribution Page

Fall 2012 Contributions

This semester, I worked on the Low Flow Stacked Rapid Sand Filtration (LFSRSF) project. My team and I tested and improve the performance of a prototype system. My tasks within the project were as follows:

- Collected data from students who previously built the prototype filter to learn about the methods behind this design.
- Researched head loss calculating methods for flows through sand as well as bends, tees, expansions, and constrictions.
- Assisted in head loss and flow calculations in MathCAD to determine the locations of maximum head loss and possible modifications.
- Updated the MathCAD file as the prototype LFSRSF was modified.
- Assisted in determining the actual flow through the system by timing how long it takes the system's flow output to fill up a certain volume.
- Ordered parts for fabrication and assisted in modifications to the LFSRSF (switched spring valves on the outlet pipes to swing valves, added a ball valve on the outlet side of the filter, and replaced the 1" diameter backwash pipe with a 1.5" diameter pipe.
- Ran hydraulic testing with and without sand to determine actual head losses experienced through the system.
- Organized and analyzed results from performance tests, which showed that the filter can achieve up to a 99% removal rate.

The Fall 2012 LFSRSF Team created a working model of the LFSRSF that was tested in Honduras January 2013.

Spring 2013 Contributions

This semester, my team and I worked on making improvements to the Low Flow Stacked Rapid Sand Filter based on feedback received from the engineers and operators in Honduras. A major design change was strengthening the connections of the slotted manifolds inside the filter. Also, a sand drain was designed to allow operators to easily remove the sand from the filter. My team and I also built a small-scale LFSRSF for EPA's P3 Sustainability competition. The filter was created as a hydraulically working model with clear acrylic pipe to allow judges and the public see how the filter and cleaning of the sand works.

My contributions this semester were both hands-on and managerial. I assisted with the design of the manifolds, the head loss calculations through the small-scale filter to determine adequate sizes of piping, and the construction and testing of the small-scale filter. Additionally, I kept communication flowing within the group and other parties, including EPA, team leaders, and our lead mechanic. I was also in charge of ordering materials for the small-scale filter. The filter at the competition worked very well. There were many people interested in the concept of the LFSRSF.