

Fall 2010 SRSF Research

[Bench Scale Model](#)

This is our current experimental apparatus.

- Backwash
 - We need to prove the ability to clean the stacked rapid sand filter by backwashing. In order to prove backwashing works, we need to fully fluidize the filter and settle it to continue filtration.
- Head Loss Measurement
 - The head loss across the filter over time is the governing factor that determines the filtration cycle time. The build up of head loss ultimately determines how often the filtration unit will require backwashing.
- Filtration Unit Design
 - It is necessary to design a filtration unit that can be built at our existing water treatment plants and be incorporated into future plant designs. This includes a hydraulic analysis to calculate the critical elevations in relation to how the filter fits in with the sedimentation tank effluent weir and the distribution tank. This analysis must be done using the approach for the design tool with correctly named variables, and with the standard inputs of flow rate and then automated design of the filter system. This automated design must include full hydraulic design of all of the piping required.
- Performance Study
 - A number of parameters will need to be studied in order to find the optimal design conditions for a filtration unit. The variables to be studied experimentally include diameter of sand grains, depth of each filter layer, horizontal spacing between pipes, and filtration velocity. A robust study of all these variables will require a long period of time, and it is thus recommended that we proceed with the design and installation of a filtration unit with conservative design parameters. Once full-scale performance can be analyzed, we can proceed with an exhaustive performance study to further optimize the stacked rapid sand filtration unit design.
- [Challenges Stacked Filter Fall 2010](#)
- A [Detailed Task List](#) was made to outline the objectives for the semester
- [Report 1 - 9/24/2010](#)
This contains the detailed task list for the semester as well as results for backwash bed expansion post-backwash settling.
- [Report 2 - 10/8/2010](#)
This contains results from our time series dye study and steady-state dye study.
- [Report 3 - 10/22/2010](#)
This report contains dye study data from two continuous-sampling tests, which provided insight into flow distribution in the filter.
- [Report 4- 11/5/2010](#)
This report contains preliminary performance study data indicating the successful function of a six layer stacked filter.
- [Report 5- 11/19/2010](#)
This report contains results from the performance study further reinforcing that the filter is functioning very well and is viable for field use.