anc26

Anderson Cordero's Individual Contribution Page

Summer 2010 Contributions

During summer 2010 I had the pleasure of working on the Stacked Rapid Sand Filtration team. I assisted in building a bench scale model of the stacked filter, controling the influent raw water turbidity and keeping its turbidity as consistent as possible, running a plethora of experiments of varied parameters such as filtration velocity and dosage, and successfully backwashing the system by sequentially fluidizing individual sand layers. I also contributed in conducting a performance comparison to a conventional single layer filter system of the same depth as an individual layer of our stacked filtration system (20 cm), and in adding pressure sensors to the apparatus to provide a more complete comparison. The original apparatus consisted of four filter layers in a white 4" I.D. PVC pipe, and I assisted in replacing it right before the Fall semester with a clear acrylic pipe of the same diameter but with six filter layers. The corresponding inlet and outlet plumbing for these extra two layers were also added. This modification allows for visual observation of the sand bed during backwashing or to complement tracer dye studies.

Fall 2010 Contributions

During Fall 2010 I have continued working on the Stacked Rapid Sand Filtration Team. In order to wrap up the summer proof-of-concept research, we as a team have made systematic physical observations of the filter back washing process in the clear filter column. We visually observed the back washing process in the filter both to confirm that the bed of a stacked filter could effectively be fluidized, and to develop a procedure for initializing and terminating the process. The back washing steps were varied and the observations were used to determine which method of back washing was most effective. We finished up a proof-of-concept paper explaining the concept of stacked rapid sand filtration, using the summer performance data and this semester's backwash observations, to show that the technology is viable at the laboratory scale and to help put the technology out there. We have been running time-series and steady-state flow distribution tracer dye studies to determine whether flow in each layer of the filter is in fact uniform. These studies could help us determine how much of the sand bed is effectively being used. We have also been running filter performance studies similar to those that took place during the summer so as to better understand occurrences such as turbidity spikes that were observed during the summer and verify that we can get the same performance with a filter with six layers. We have also been working on: developing a full-scale filter design tool, applying to the EPA P3 sustainable design competition to fund future developments, and designing a full scale demonstration unit that we will bring along with us to Honduras in January.

In the near future we plan to: build two 20 cm single layer control filters in order to compare upflow from downflow filtration performance with different inlet /outlet configurations, and possibly optimize the sand grain size of the filter media.