mg875

Mihir Gupta's Individual Contribution Page

Fall 2012 Semester

Member of the Low Flow Stacked Rapid Sand Filter team. We need to start by collecting data from the existing model. This data would include velocities, headloss, water levels etc for a given flow rate. We then need to use this data to build a mathematical model which will help us find out any potential problems with the setup. It should also help us realise the points at which maximum headloss occurs, so that we may replace the part, as currently, without any sand, the headloss is too great for actual usage.
After making such changes as necessary, a complete fluid and performance testing will be carried out, so that the design may be approved.

UPDATE:

On implementing the mathematical model, it was determined that the current head losses would make the system unstable and would cause unreliable. It was then decided that the spring valves were a major contributor to this high head loss, and thus, they were swapped out with swing check valves. It was also decided that a larger diameter backwash pipe would help reduce this head loss.

On making these changes, we noticed that during the backwash run, the LFOM continued to pass water. Ideally, there should not be any water flowing out of the LFOM during the backwash, and thus, we had to add a ball valve.

We then noticed that during the backwash run, there were large variations in the head loss. We determined that these were caused by air bubbles, which cause a hydraulic disconnect in small pipes and thus, increase the head loss. We then worked to make the entire system air tight.

The next order of business was performance testing. We added different concentrations of clay suspensions along with a constant coagulant dosage. We obtained a removal percentage of about 99%.

Spring 2013

Over winter break the low flow stacked rapid sand filter was taken to Honduras to be demonstrated. However, shortly after the filter was put to the test, it broke down due to the fragility of the manifolds. Thus, the next step was to redesign the slotted manifolds. Simultaneously, we realized that the Stacked Rapid Sand Filter had won the phase 1 part of the EPA P3 competition and that we had to present the filter at the phase 2 part of the competition in Washington DC in April. Consequently, we diverted our attention to writing the proposal for the filter and building a prototype of the filter which could be demonstrated at DC. Scaling down the filter was a major issue during construction. The finished product was 6 ft tall and 2 inches wide and worked well at the competition. We have yet to hear back from the EPA regarding the results, however, we did get second place for the ASCE Sustainable Development Award.
After returning from DC we finished the modifications to the slotted manifolds and we designed a sand drain. These are in the process of being implemented.